INDUSTRIAL-ARTS MAGAZINE

Volume IX APRIL, 1920 Number 4

THE GENERAL PROJECT METHOD OF TEACHING THE INDUSTRIAL ARTS

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SEVERAL years ago a school superintendent said to me: "We'll not teach manual training in our schools until you manual training teachers come to a more general agreement on what should be taught and how it should be taught." A little later a college professor of education remarked that while manual training came into the schools supposedly for the purpose of revitalizing the curriculum, the teachers of the subject were making it just as formal and dry as any of the academic subjects ever had been.

Invariably in the history of education the tendency of any innovation in school development has been that after a time it has become formal and the subject matter instead of the child has received first consideration.

This has been true both of the humanistic and of the scientific elements in general education. Latin came into the curriculum for practical purposes; its chief justification now, as advanced by those who teach it, is that it has formal disciplinary value. Likewise science has been and even yet is by many teachers, justified as meriting a place in the curriculum because it trains the general power of observing, etc.

More recently as the industrial element found a place in the school it was because of its practical social value. Whether we consider the need for a revival of interest in the handicrafts as felt in the north countries of Europe or Della Vos' desire to give better practical knowledge of tools and materials to his technical students, or Pestalozzi's insight into the value of industrial training for delinquents in society or the later "manual labor" movement in this country, in each case the practical value of handiwork was its justification in education. But the schoolman has more and more sidetracked practical and social values and has appropriately named his conception of this work in the school "manual training." The manual training teacher has followed the lead of teachers of academic subjects and justified his work by saying that it trained the power of observation, the reasoning faculty, trained in general habits of neatness, accuracy, etc. To be sure many manual training teachers have faithfully done their work, accidentally reaching many boys thru their interest in manipulation and things concrete in general. This, however, has been in spite of the prevailing theory among teachers as to the place in the school of manual training. Altho discarded by psychologists we have clung to the formal disciplinary theory. It would seem that teachers of manual training have been even slower than teachers of academic subjects in accepting modern educational thinking.

But this has not been the only theory advanced for manual training in the school. In turn we have tried to justify it as having vocational guidance value and as being prevocational. In the one case we have failed to realize that the formal nature of the manual training work has often set a boy against anything mechanical and that social and other advantages in a trade rather than the nature of the work itself often decide the vocation. And in the other case, manual training as usually taught has not been like any trade and any prevocational value it may have had, has been of a *general* vocational nature—again a formal disciplinary justification. Another early justification for manual training was that it would keep boys in school longer. Statistics do not show that this has been the case to any appreciable extent however.

Altho to some extent the educational innovators and reformers saw the general educational value of manual activity in addition to its practical value and also in spite of the conclusions of more modern leaders in educational thought, like Dr. Dewey, the average manual training teacher has clung to the old faith. Notable exceptions to the general rule have been apparent in different sections of the country but the coat-hanger-clothes-cleat type of manual training has persisted.

But why should the manual training teacher break away from his formal work? Hasn't the academic teacher stuck to his bookish work? All of us have been teaching tool processes and books instead of boys and girls. However, studies in "how children learn", "the psychological method vs. the logical method", and the fundamental value of concrete experiences in perception forming have had their influence in school practice. It would seem, however, that the tremendous recent interest in vocational education culminating in state and na-

tional aid was necessary to get manual training out of the rut in which it had been moving complacently for a generation or more.

As the vocational movement began to gain headway, on all sides, the cry was raised, "What of manual training?" But the vocational education movement has been the best thing which could have happened so far as manual training is concerned. It has cleared away a lot of rubbish. Manual training stands on its own feet now. It has a clear field! There is a definite place in general education for motor activity. The constructive instinct of children is just as fundamental educationally as is their play instinct. We must make use of it in school work from the kindergarten to the high school.

In the new name, "Industrial Arts", which is gradually replacing that of "manual training" the newer ideas are embodied. As Dean Russell says[1] this third element (industrial education) is needed in our school curriculum (the other two being the humanistic and scientific). He says: "If the humanistic studies are essential in the training of the child in his social relations, and the scientific in his relation to the physical world in which he lives, it is equally important that economic studies be included in the curriculum to provide instruction in the industries from which man gains his material possessions. I mean the study of industries for the sake of a better perspective on man's achievements in controlling the production, distribution, and consumption of the things which constitute his material wealth."

This acquaintance with the work of the world thru actual participation in its activities has its educational value enhanced by one of the fundamental characteristics of child nature, the constructive tendency, without the exercise of which it is probable that a serious handicap to full and natural development will result. But the work of the world is of many kinds and some formal woodworking will not suffice to bring about much acquaintance with it; neither will it provide sufficient opportunity for the exercise of boyish constructive tendencies along lines of natural interests. A variety of activities will be necessary.

Again as to the method of instruction: Educators have decided upon the thought-provoking *problem* as the best educational unit of instruction. This is to be accompanied by suitable data for its solution. In the field of industrial arts the form which the *problem* takes is that of the *project*, signifying a real and worth while need of the child. It is not conceivable that every child can realize the satisfying of his most pressing needs in a shop equipped for woodworking only. If his needs are tied up at all with the busy world about him the variety of materials used and processes employed will have its effect in shaping his interests and what seem to him, his most worth while needs. To many industrial-arts teachers the *project* has meant merely giving the boy more latitude as to what he may make in the conventional woodworking shop. But this is not sufficient; this shop is too limited in its possibilities. The opportunity to make *projects* which are thought provoking and which satisfy real needs of the boy are of vastly more educational value than the formal manual training model or exercise, but we should go a step farther and make what may be called the *general project* the unit of instruction in industrial-arts work.

This unit of instruction would not limit the project to one or even two materials to be used in its construction, but a variety of materials and appropriate tools would be available. This need not be more expensive from the standpoint of equipment than the conventional woodworking-shop equipment as only one or two units of equipment of each kind need be provided. The seemingly increased difficulty of teaching under such conditions is counteracted, at least partially, by the increased interest of the boys. The different kinds of equipment are located in one large room, or in some instances specific units are placed in small rooms immediately off the main room.

As an aid to employing the *general project* as the instructional unit in teaching industrial arts, I am presenting a lesson plan and explaining its use.

As preliminary to the use of a "lesson plan" in teaching the following conditions should be recognized:

1. Definite and detailed preparation is essential to the teaching of any lesson whether academic or industrial.

2. Especially in the case of the young teacher, it is essential to the successful teaching of any unit of instruction that both the order of the steps in the material which is to be taught and the method by which it is to be presented be written out in advance.

3. No cut-and-dried lesson plan can be prepared, good for all times and for all classes; probably the same lesson cannot be taught in identically the same manner twice with equal success.

4. The first essential to successful teaching is a thoro knowledge of the subject-matter to be taught. But to insure that presentation will bring response from the child, the subject-matter must be organized psychologically; that is, to meet his needs, and in harmony with his degree of development.

5. The child's needs are definite and simple, as well as practical; these points must be kept in mind in organizing the subject-matter around a few important heads.

6. No matter how well organized, consideration of the method of procedure is essential to proper functioning of a lesson. This phase of the lesson plan should direct the child: (a) in formulating his need; (b) in taking steps to satisfy it; (c) in appreciating and criticising the significance of his accomplishment.

7. As the project seems to be the best unit of instruction in industrial-arts teaching, the inductive development type of lesson plan lends itself best to the

[1]Russell "The School and Industrial Life"—Educational Review, December, 1909.

presentation of this unit of instruction. But there is also a place for the lesson for appreciation and (especially in the vocational phase of our field of teaching) for the drill lesson.

8. The double column form of lesson plan seems best adapted to the coordinate arrangement of subject matter and method of procedure.

9. In preparing a lesson plan for teaching a general *project* unit of instruction, a plan for teaching any definite project cannot be prepared, as probably no two boys will decide to make identically the same thing. But a definite plan for teaching can be formulated. And this is what is attempted in the plans which follow.

LESSON PLAN IN INDUSTRIAL ARTS FOR THE JUNIOR HIGH SCHOOL BY THE GENERAL-PROJECT METHOD.

I. The topic: Industrial Arts projects which appeal to a boy.

II. The teacher's aims:
1. To give boys opportunity to use their constructive instincts and capacities in a beneficial manner.
2. To help boys get the habit of planning to meet their own needs.
3. To assist in making boys "handy" about home and elsewhere as needs arise.

III. Analysis of the teaching situation:
A. Every boy is to—
1. Initiate his own project.
2. Plan his project.
3. Make his project.
4. Criticise his project as he works and when it is completed.

B. Every boy is to consider the following before deciding on what he is to make.
1. It must grow out of a need worth while and related to conditions of real life.
2. He must have some idea of how he is to make the thing; he is not to depend on the teacher providing all of the ideas involved in the construction.
3. He must submit a sketch or drawing of what he is to make or otherwise convince the teacher that he has some definite ideas about it.
4. He must familiarize himself sufficiently with the equipment and materials available that he can be reasonably sure of making the thing he plans.

IV. Arrangement of subject matter and procedure.

A. Initiating the project.

Subject Matter.	*Method of procedure.*
1. Getting ideas from a variety of sources. a. Some boys will have definite ideas already formulated. b. Others will need to see many things to suggest something they want.	1. In the shop there are: a. Completed projects of different types made by other boys. b. Photographs and blue prints of many things which boys could make. c. Books, magazines, etc., containing pictures and description of similar things.
2. Getting the boys interested and thinking about what they want to make.	2. The attention of the boys has been called to these things.
3. Preparation, that they may come with ideas.	3. At a previous period they have been told that they may make things that they would like to make and for which they have need; also that they are to get ideas wherever they can for making the things they decide on.
4. Discussion by the boys. The interchange of ideas and the necessity of proving the practicability of their choice will provoke much thought on the part of the boys. They will become interested in what they are going to do.	4. At the opening of the class period the boys are asked to tell the class what they want to make, why they want to make these things and what they know about how to make them. (Pupils' aim: To make something they have a need for.)

B. Planning the project.

1. The need for a plan. a. To show the teacher and other boys what they are going to make. b. To have something to work from. c. To get them to thinking about the problems involved in their projects.	1. Having decided on what we are to make, what is the next step? Why must we have something to work from? Do you think you know how you are going to do each part of your project?
2. The kind of plan to be submitted. a. A written description. b. A rough sketch. c. A crude shop drawing. d. An accurate and fully dimensioned shop drawing. Different kinds of plans may be expected. The advantages of the best are to be gradually impressed on the minds of the boys.	2. What are you going to work from? What kind of a plan have you? How are you going to show me how you intend to make your project? These and similar questions are to be asked the boys. Boys prepare plans. The boys are to be encouraged to make the best plans they can. The best plans are to be shown to class. As the boys work from their plans they will see the need for more accurate ones. An occasional class period is to be used in developing good plans.
3. The material needed. a. A bill of material. b. Cost of material.	3. Make a bill of material showing each item of material and cost of same. Boys do this. A previous class period has been given to class work in preparing bills of material.
4. Tools to be used. a. List of tools.	4. What tools will each of you need for making your project? Boys make lists, as complete as possible.

C. Making the project.

1. Cutting out stock and getting items called for in bill of material together. Plans are used. Reference is made to bill of material. Tools, as needed, are obtained from tool room.	1. In connection with your project, what things have you done? (A boy will sum up what he has done to date. It is not to be expected that all boys have made the same degree of progress, but a class period for discussion when a number have completed these steps will be profitable.) What are you ready to do now? Before you begin making your project what must you do? Boys get material ready for beginning construction.
2. Tool operations, as required, are performed on each piece of material.	2. Boys begin work on pieces of material. They consult each other and the teacher about best methods to use, etc. (In project work, watching other boys at work, talking over their problems with other boys, etc., will be of great value.) The teacher is to make suggestions here and there as needed. Boys consult completed projects found in shop and

	elsewhere, illustrations, drawings, etc., for suggestions. A better way of doing things is to be suggested as poor work is observed. Where one boy is doing an exceptionally good piece of work the attention of other boys is to be called to it.
3. Assembling the project. a. Trying parts and fitting pieces together. b. Arranging fastenings.	3. Boys will try out parts of the project as they are completed. Temporary or partial assemblies will be made from time to time.
D. Criticising the project.	
1. a. Criticism of work as it progresses. b. Criticism of the completed project. c. Will it do the work which it was planned to do? d. What changes could be made in the planning or execution which would make the project better? e. Actual use of the article made.	1. a. As the boys work on their plans and in the construction of the project, frequently they are to be asked what they think of it. Will it work? Would a change in the plan be an improvement, etc.? They are to be led to think while they work. b. When the thing is completed it is to be tried out. Other boys in the class should see the result of the test. c. Remarks of approval and disapproval are to be made by the teacher as the project merits them.

LESSON PLAN FOR TEACHING IN THE INDUSTRIAL ARTS BY THE PROJECT METHOD.*

I. Topic—The selection and execution of a project.

II. Teacher's aims—
1. To furnish to the pupils opportunities for expression of their instincts of construction, manipulation, and participation. (Responses of knowledge, action and attitude.)
2. To develop their understanding and appreciation of industrial activities and sympathy toward the productive members of society. (Response of attitude.)
3. To teach them correct habits of manipulation. (Responses of knowledge and action.)
4. To teach them proper attitude towards manual work and to instil in them the desire to make practical use of the knowledge acquired at school. (Response of attitude.)

III. Logical outline.
1. Conception of the project.
2. Planning the project.
   a. Drawings or sketches.
   b. Consideration of materials.
   c. Consideration of cost.
   d. Consideration of construction difficulties.
   e. Consideration of tools.
3. Execution.
4. Criticism.
5. Putting the finished project into use.

Steps in Teaching.

I. Conception.	I. The pupil selects a project growing out of a real need or from suggestions from books or the teacher. Of great assistance will be a sample collection of finished projects, catalogs and craft periodicals. Emphasis should be placed on the proper method in selecting a project considering these points. 1. Does the project grow out of a need? 2. Is it adapted to the pupil's constructive ability? 3. Can it be completed within reasonable time? 4. Is the available equipment sufficient for its execution?
II. Pupil's Aim.	II. A judiciously selected project will naturally develop the pupil's aim: "How to go about the execution."
III. Planning.	III. This should include: a. Drawings and sketches. b. Consideration of material. c. Consideration of cost. d. Bill of material.
IV. Execution.	IV. No project should be undertaken beyond the capacity of the pupil. He should have a conception of the points involved. The teacher's part should be directive. Projects should be progressive.
V. Correct Habits of Procedure, Drills, Recitations.	V. Occasionally there should be recitations and demonstrations on identical points of interest. The class should not drift too far apart in the project method of teaching. It would be advisable to unite it for short periods on seasonable activities.
VI. Teacher's Aims.	VI. The educative value of the project will be evident in the quality of the finished project and in the attitude of the pupil.
VII. Application.	VII. Practical use of the project.

In considering the above plans attention is called first to the "teacher's aims". Instead of the conventional aims of skill and learning how to make certain joints properly and how to use tools correctly, the emphasis is placed on what seems more fundamental in boy development. In general education industrial skill is incidental to industrial intelligence, appreciation, etc. Even in vocational education *thoughtful* use of manual skill is receiving increased attention. Boys naturally like to make things, and the home seldom provides this opportunity any more. The school must make use of this tendency in a beneficial manner. The school should be real living, and life is continually presenting problems to be solved. Ordinarily the school has done little in presenting real problems to the child. The conventional manual training model, where the boy works from a blue print after every detail of the construction has been explained by the teacher and probably a model made before the class, leaves few thought-provoking problems for him to solve. It can scarcely be said that much resourcefulness in meeting life's problems has been developed. But when the conditions of the project-method of instruction have been met it would seem that some developing influences are bound to result.

Careful attention to an analysis of the teaching situation is also extremely important. By doing this breakers which may wreck the whole scheme can be avoided. Forms 1 and 2 following the lesson plans will assist in getting the boys to plan what they want to make before beginning the construction. Form 2 has to do with home activity in project work which should be encouraged at all times. Both of these forms are intended to be printed on the fronts of large manila en-

*Prepared by Henry Herrle, an Industrial Arts student in Miami University.

No. 1. INDUSTRIAL ARTS REPORT ON SCHOOL PROJECT.

.....School. Date.....
Name of pupil.....Grade....Classification of project.....
(To be filled out by pupil.)
1. What do you want to make?.....
2. Do you want to make it at home or at school?.....
3. Where did you get the idea?.....
4. On a separate sheet of paper give a brief description of your project and put it in this envelope. If you can, make a drawing.
5. Who will use the finished project?.....
6. How much time will you need to make it?.....
7. What materials will you need?.....
8. What materials can you furnish?.....
9. What tools do you need?.....
10. What tools can you furnish?.....
11. Tell briefly how you will go about the construction.....
.....
.....
12. Date of beginning of construction.....
13. Date when completed.....
(To be filled out by teacher.)
Attitude of pupil.....Quality of workmanship.....
Time consumed .....
Remarks: .....
.....
.....Teacher.

No. 2. INDUSTRIAL ARTS REPORT ON HOME ACTIVITY.

.....School. Date.....
Name of pupil..... Address.....
Grade.....Classification of project.....
(To be filled out by pupil.)
1. Describe briefly on a separate sheet of paper your project and tell how you went about its construction. Put this description and any drawings you may have in this envelope.
2. What materials did you use?.....
3. What tools did you use?.....
4. How much time did you need? Give time in hours:.....
5. Did you receive any assistance?.....From whom?.....
6. Did you get any pay for your work?.....How much?....
7. Did you work from a plan?.....
(To be filled out by teacher.)
Date of inspection of project.....Attitude of pupil.....
Quality of workmanship.....
Remarks: .....
.....
.....Teacher.

velopes into which drawings, sketches, etc., of his project are to be placed by the pupil.

When the general-project plan of teaching industrial arts is suggested many industrial-arts teachers question how design, shop drawings, tool processes and methods of construction are going to be taught. In the first place these things are to be considered as secondary and incidental to the more fundamental things stated as the "teacher's aims" in the lesson plans presented. Then, in the second place, much of that which we have been trying to teach children under design, shop drawings, tool processes, etc., is not taught at all. These things have been organized from the adult's point of view and are not related to the child's experience and consequently do not function at all. Because he memorizes some rules or copies some adult-made designs or makes a slight variation from the copy in his design we think that he is learning design. The same is true of shop drawings and tool processes. Haven't we all noticed how little of the class demonstration is carried into the shopwork? We have found it necessary to follow up class demonstrations with individual instruction and even then often do the work ourselves before we get the results *we* want.

But when a pupil makes something he wants and sees a real need for it, he really thinks and actually *plans* what he wants to make and how he is going to make it. He will make a better plan when by that means he thinks he can make the thing better. When he sees the need for more accurate measurements to work from, then and then only will he make a better shop drawing which is really his own. The same principle holds good in using more appropriate tools and better methods of construction. These things will naturally follow when he sees a need for them.

This does not mean that the trial-and-error method of learning shall be followed. Occasionally this method may be the best one to follow; permitting him to work out his own salvation may be best sometimes. But the teacher is present and largely provides the stimulus, the environment. He should question poor methods of doing things, he should call attention to better results obtained thru better methods, etc. The work of other students will greatly assist here too. Better planning, better methods of construction will bear fruit just as better results are obtained thereby. The pupil will work these things out himself and they will be a part of his own experience and they will last. Too much emphasis cannot be placed on surrounding the pupil in the shop with examples of good planning and of good workmanship in all types of construction. Thereby he will be given many ideas.

In conclusion, I wish to add: As educators in general are advocating the thought-provoking problem as the unit of school instruction, does it not behoove the industrial-arts teacher to carefully consider his organization of instructional material to the end that the project which meets the real needs of the boy be his unit of instruction? And further, can this project be made socially worth while if the woodworking field of industry only is considered? This has been a very general presentation only of what to my mind seems a very important subject. Details have to be worked out very carefully.

THE lessons taught by the war must not be lost with the coming of peace. American industry has justly prided itself on its scrap pile. The American army has abolished the human scrap pile. The American high school has heretofore scrapped its children when it should have scrapped its aims, its method of organization.—*Dr. J. L. Tildsley.*

Felt: A Fascinating Fabric for the Expression of Design

Bonnie E. Snow and Hugo B. Froehlich

Article Two.

TO the designer, all interesting shapes are regarded as sources of suggestion. He looks at birds, insects, flowers, trees and all other landscape shapes, in the light of "material", to be modified, changed and adapted to suit his needs. He is not concerned with the question of realism. He does not care whether the parrot or the bee or the nasturtium or the cloud "looks natural" or not. He wishes to create thru the suggestion of bird, bee or buttercup, a system of lines, shapes and colors that is in tune with his purpose, whatever that may be. So we have the Lion of St. Mark's, the Peruvian Fish, the Japanese Wave and Mountain, the sculptured

Fig. 1. Holder for Tea Pot Handle.

rhythms based on the human figure which are found in ancient churches,—all ridiculous from the standpoint of realism, but magnificent as works of art.

A Felt Holder for a Tea-Pot Handle.

The parrot's shape and the parrot's brilliant scheme of coloring have been the suggestions for the attractive addition to the tea table which is shown in Fig. 1. Its use is to protect from injury "the hand that pours." Its color scheme may be adapted to the rest of the tea service or to the color scheme of the dining room. Our model is expressed in an analogy of yellow, orange and red, balanced with black and white.

Fig. 2 shows the pattern drawn or cut on 3 by 8½ inch paper. Fig. 3 shows the pattern laid on a piece of orange folded felt, as the parrot shapes must appear alike on each side of the holder, and must be joined together as shown in Fig. 4. Fig. 5 shows that all cut edges are covered with a blanket-stitch, and that the edges of the head and tail are buttonholed together, leaving an opening in which the handle is to be slipped when the holder is in use. Fig. 6 shows the various

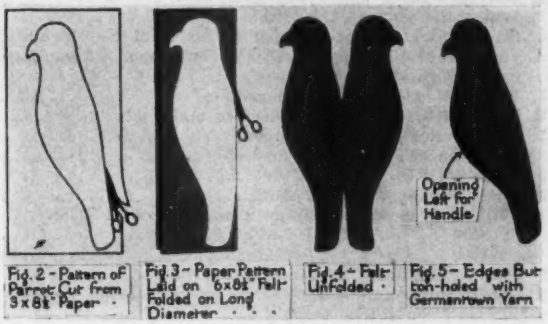
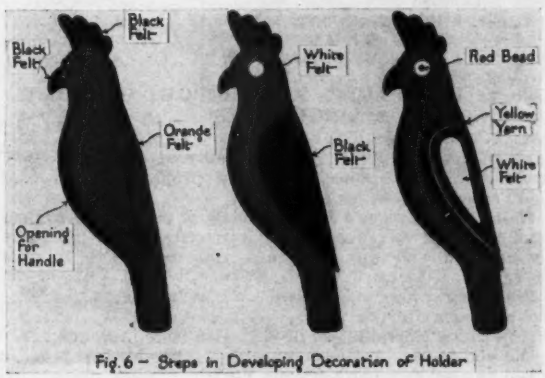


Fig. 2 - Pattern of Parrot Cut from 3 x 8½ Paper
Fig. 3 - Paper Pattern Laid on 6 x 8½ Felt Folded on Long Diameter
Fig. 4 - Felt Unfolded
Opening Left for Handle
Fig. 5 - Edges Buttonholed with Germantown Yarn



Figs. 2-6. Details of Making Felt Handle.

steps in developing the decoration of the holder. Pieces of black felt are cut, in duplicate, for bill, comb and wing. White shapes are added for eyes, and for wing decorations. These shapes are first pasted in place and afterward secured with stitches of yarn. A red bead sewed on the white circle which locates the eye, is the finishing touch.

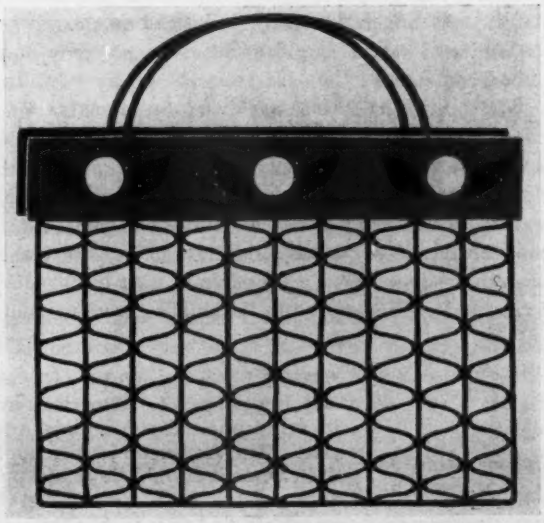
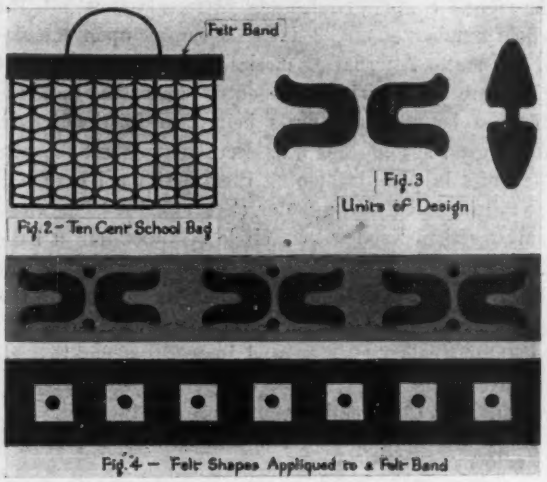


Fig. 1. School Bag.

A School Bag with Felt Decorations.

The ten-cent stores usually offer an interesting assortment of school bags made of netted string. To these, various additions of bright felt may be made, greatly increasing their interest. Fig. 1 shows a common variety of school bag, enriched by the addition of a band of orange felt, with black and green shapes appliqued upon it. The problem is a simple one and admits of much originality. No two bands need be alike, for each student is capable of planning units, arrangements and color schemes for himself. The design should be expressed first in colored papers, and submitted to the teacher for criticism, or better still, the paper designs should be posted for discussion by the class. The units when cut from felt may first be pasted on the felt band and then secured with stitches. Blanket stitch, running stitch or French knot stitch may be employed, using Germantown yarn in colors that conform to the



Figs. 2-4. Details for Felt Bag.

general scheme selected. Figs. 3 and 4 give several suggestions for units and bands.

A Felt Bag for Handkerchief or Work.

A class of sixth-grade children each made a bag similar to Fig. 1. Tho all started with two twelve-inch discs of felt, the colors, appliqued units, tassels and pendants were so diverse that each girl felt the pleasure of personal choice and expression. When finished, the collection of bags was hung on a screen before the class. It looked like a bright garden of many hued flowers, and gave joy and delight, as flowers do, to all who beheld them.

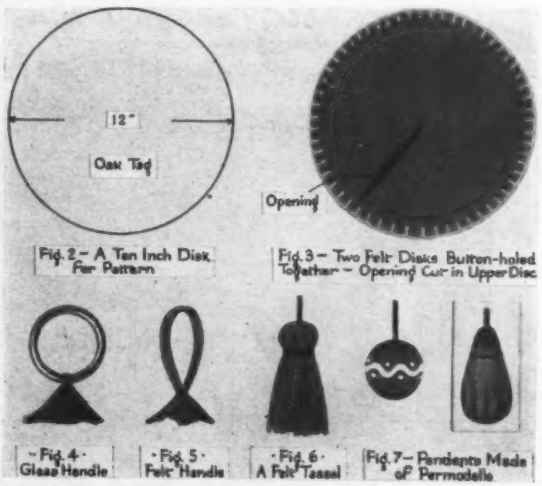
Fig. 2 shows the twelve-inch disc of oak tag that was used as a pattern. This was laid flat on the felt selected for the bag, and a chalk mark was made around it. Two pieces, exactly alike, were thus marked out and cut. One of these pieces was then cut from circumference to center, as shown in Fig. 3. The upper disc was then decorated with three groups of three circles each, cut from felts of contrasting colors, and appliqued at equal distances from each other. In the model illus-

Fig. 1. Felt Bag for Handkerchiefs.

trated, the bag was made of violet felt, the edges were button-holed with light violet yarn, and the decorative circles (about an inch and a quarter in diameter) were in yellow-orange, yellow and yellow-green, thus forming a split complementary color scheme.

The edges of the felt discs were then buttonholed together (if preferred, button-hole stitches may also be used to protect the edges of the opening).

A colored glass bracelet, such as is affected by Chi-


12"
Oak Tag
Opening
Fig. 2 – A Ten Inch Disk For Pattern
Fig. 3 – Two Felt Disks Button-holed Together – Opening Cut in Upper Disc
Fig. 4 · Glass Handle
Fig. 5 · Felt Handle
Fig. 6 · A Felt Tassel
Fig. 7 – Pendants Made of Permodello

Figs. 2-8. Details for Making and Ornamenting Felt Bag.

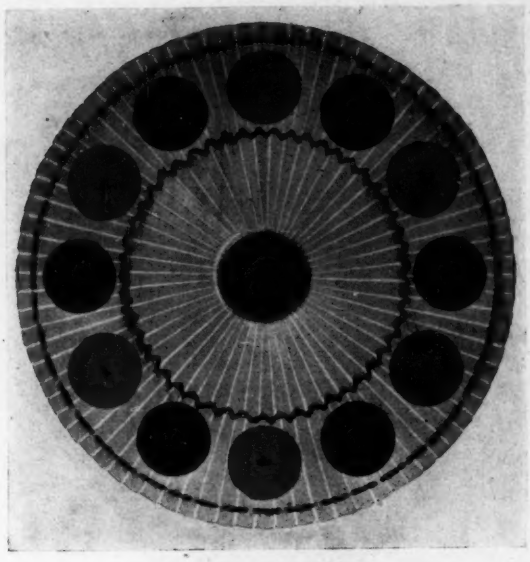


Fig. 1. Japanese Hot Dish Mat.

nese laundrymen, may be used for the handle of the bag. Our illustration (Fig. 4) shows one attached to the center of the upper disc by means of a few strong stitches, or by a narrow felt strap. In the absence of the glass bracelet, an inch-wide strip of felt, sewed to form a loop which slips over the hand, does very well. (Fig. 5).

A tassel of felt or of yarn, (Fig. 6) or a pendant of permanent modelling clay is then suspended from the center of the lower disc. (Fig. 7). This serves the double purpose of pulling the lower disc away from the upper and of providing a decorative finish.

Japanese Hot Dish Mats.

Sometimes in the Oriental shops we can find sets of circular "hot dish" mats, generally five in number, and ranging in size from six to twelve inches in diameter. These mats are made of cardboard discs, wound with split straw, pale yellow in color, and presenting a smooth, glossy surface, very beautiful in itself. Enhanced by a simple decoration of colored felts, these mats are extremely decorative and are useful on the luncheon or tea table, or about the house wherever a protection for a polished surface is necessary.

The five mats afford an opportunity for expressing five different color schemes, all equally interesting. The satiny surface of the mats is so pale in tone that it may be considered as a neutral. The unit of design is a circle, cut after tracing around a Chinese coin or a "quarter."

Fig. 1 shows one of the finished mats. The colors selected formed a complementary scheme of yellow and violet. Fig. 2 shows the mat undecorated. The white thread stitches have been covered with similar stitches of black Germantown yarn. Fig. 3 shows the coin placed on a piece of light violet felt, with a pencil tracing the shape. The cut-out felt circle appears above at the right. Similar circles are cut from yellow felt, the whole number of circles used depending upon the size of the mat. Alternating circles of yellow and of light violet are spaced within the outer rim of the mat, the distance between the units being carefully adjusted. When good spacing has been secured it is best to paste the units in place, fastening them afterward by a single stitch placed at the center (See Fig. 1). The whole mat was then lined with a circle of violet felt, a little darker than the tones used for the circular units. This lining was cut by tracing around the mat itself. It was glued to the under side of the mat.

Other color schemes used in working out this attractive set of table decorations were as follows: (1) Bright red circles with black lining for the mat. (2) Circles of yellow and yellow-orange, with a lining of yellow-green. (3) Blue and blue-green circles with a lining of blue-violet. (4) Orange and light-orange circles with a lining of normal blue. In all cases black Germantown yarn was used for the stitches.

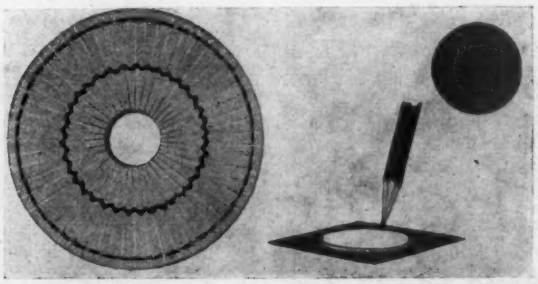


Fig. 2. Mat Undecorated. Fig. 3. Method of Making Dots.

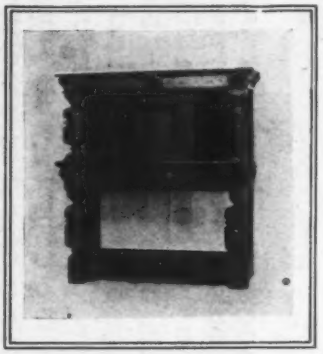
ELIZABETHAN FURNITURE

L. G. Martin

THE reign of Elizabeth from 1558 to 1603 was remarkable in many ways—for its architecture and furniture, as well as for its literature and other decorative arts. The arts of this time showed great spirit and variety. Feudalism had been abolished; the people had more freedom, and living conditions began to improve.

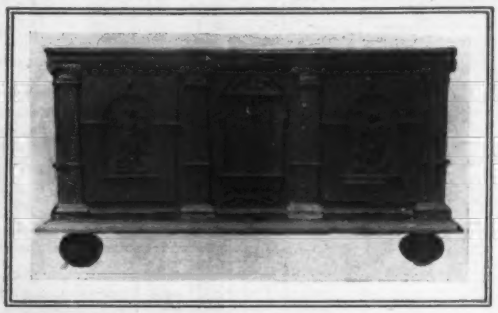
The house interiors showed the influence of the Renaissance, but they were done in a very impressive way. Large fireplaces were used with oak panelled walls

EARLY ENGLISH CHEST, SHOWING ARCHITECTURAL FEATURES. THE PANELS ARE CARVED WITH FIGURES, AND THE PILLARS ARE INLAID WITH OAK, EBONY AND BEECH. A WIDE MOULDING IS USED AROUND THE BASE.



1. OAK CUPBOARD OF LATE ELIZABETHAN DESIGN. IT IS DECORATED WITH CARVED STRAP-WORK, PANELS, AND A MELON BULB TURNED POST AT EACH SIDE. ROUND HEADED ARCHES WITH PILLARS ARE SHOWN IN THE PANELS. THE FINISH IS DARK BROWN.

2. ELIZABETHAN COURT CUPBOARD—1575-1700. CONSTRUCTED OF OAK AND BEAUTIFULLY INLAID WITH VARIOUS COLORED WOODS. THE FRONT AND THE MELON BULB POSTS ARE CARVED WITH STRAP-WORK IN LOW RELEIF IT IS FINISHED LIGHT BROWN.



4. EARLY ENGLISH CHAIR. STRONG IN CONSTRUCTION. THE CARVING IS SIMPLE BUT EFFECTIVE. THE BACK CONTAINS FOUR PANELS, THE UPPER TWO ARE DECORATED WITH CARVED ROSETTES. CONSTRUCTED OF OAK.

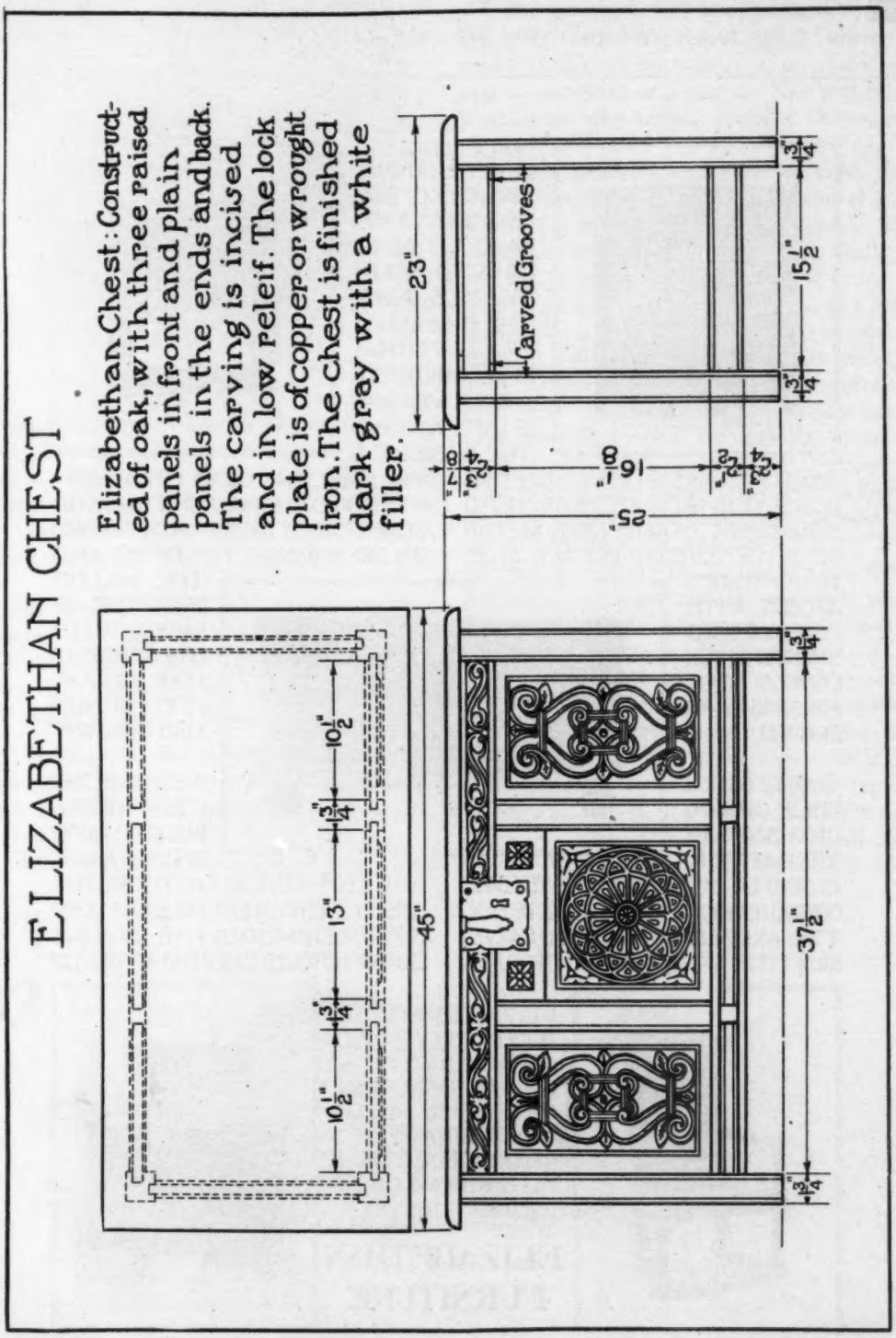
5. ELIZABETHAN CHEST & BIBLE BOXES. CARVED WITH FOLIAGE AND GEOMETRICAL PATTERNS. THE ENDS OF THE CHEST ARE PANELLED BUT UNORNAMENTED. THE BOXES SHOW NOTCHED CARVING AT CORNERS.

ELIZABETHAN CHESTS WERE OFTEN INLAID OR CARVED WITH A CONVENTIONAL FLORAL PATTERN, FIGURES OR ARCHITECTURAL DETAILS INTERLACED RIBBON PATTERNS WERE ALSO USED EXTENSIVELY.

ELIZABETHAN FURNITURE

TYPICAL PIECES OF ELIZABETHAN FURNITURE.

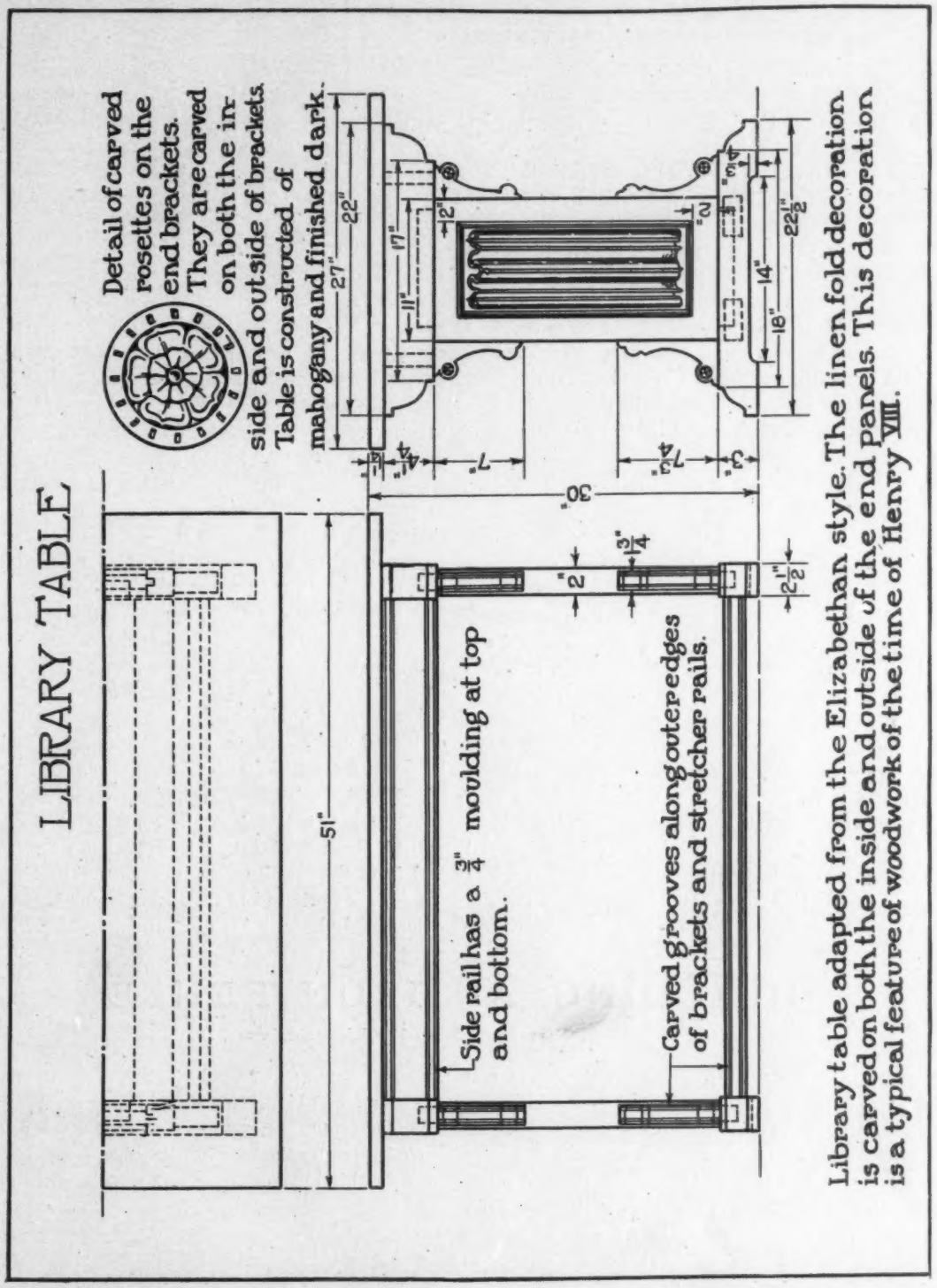
and moulded plaster ceilings. Beam ceilings were also used. Much of the woodwork was carved and the furniture was very rich. Tapestry was often used for wall coverings. Comfort rather than protection was the main feature in these houses.



The table was one of the most important pieces of furniture. At first two trestles with a long, wide board rail around the lower part on which to rest the feet above the damp floor. The bulb leg tables showed the

influence of the Italian Renaissance in England. Many of them were executed by Italian craftsmen who were residents of England. Acanthus, jewel work and the grape were often used as design motives in the carving of the table legs. On some types the tables also had a carved or inlaid frieze around the top.

The with-drawing table was a later development. The top consisted of two leaves for extension which were each equal to half the main top. When not in use they met in the center of the middle portion. The leaves did not rise when they were pulled out, but the center part dropped to the level of the extensions when fully extended, making the top double in length, They were very rich in appearance and strong in construction.


LIBRARY TABLE
Detail of carved rosettes on the end brackets. They are carved on both the inside and outside of brackets.
Table is constructed of mahogany and finished dark.
Side rail has a 3/4" molding at top and bottom.
Carved grooves along outer edges of brackets and stretcher rails.
Library table adapted from the Elizabethan style. The linen fold decoration is carved on both the inside and outside of the end panels. This decoration is a typical feature of woodwork of the time of Henry VIII.
51"
30"
27"
22"
17"
11"
22½"
18"
14"
7"
2"
2½"
3"/4

The construction and decoration of chests of this period showed many variations. The decoration often took the form of elaborately carved figures or caryatides. These were sometimes used as supports in place of architectural forms. The chests were often panelled and architectural facades were used as a form of decoration. They were also inlaid with various woods as pear, cherry, ebony, etc. On other chests decorations were worked out in inlay, or architectural arches were combined with panels. The rails were often carved with interlaced ribands or strapwork. This strapwork was used on all forms of furniture of this period. Geometrical patterns also were used for chest decorations and were often combined with conventional flower and foliage designs. The end rails were sometimes carved similar to the front ones but the ends of the chests were as a rule left plain. A moulding was sometimes used at the top and bottom in place of the carved rail. Some of the cheaper ones had ends that were constructed of one solid slab, with legs formed by prolonging the ends and cutting out some simple design in the center. The chests sometimes had beautifully wrought-iron lock plates.

Joint stools were also in use at this time. They date from about 1485. They are rarely found now. They were graceful in form and the legs showed the melon bulb form in a refined manner. Carving and jewel work were also used for the decoration of these stools.

Bible boxes were constructed slightly larger than the Bibles they were to contain and were usually decorated with conventional carvings on the front, to correspond with the carvings on the chest on which they were placed. Some were made for use on shelves, and others had a sloping top and were mounted on a table or stool, which also served as a reading desk. Some contained drawers and secret recesses. The later Bible boxes were decorated with dolphins and sprigs of acorns. Both front and sides of these were boldly carved with scroll designs outlined with small thumb nail grooves. The notched ornamentation down the edges was a favorite decoration of this period and was also found on chests. The average size for these boxes is about eight or nine inches high, two feet wide and sixteen or seventeen inchs in depth.

Elizabethan settles were of quite large proportions and were solid and strong. The mortise-and-tenon joint was used and the tenons fastened with wooden pegs. The back usually extended to the floor and helped to exclude draughts.

The massive carved four poster bed was used during the reign of Elizabeth and the carving on the posts was a feature of the period. The head of the bed was usually panelled and overall was a heavy roof. Others were beautifully inlaid and had an elaborate frieze and pilasters.

There were some very fine Court Cupboards constructed during the reign of Elizabeth. They were elaborately decorated with carving, inlay or turned work. Some had a lower shelf while others had stretchers. Some types had the lower part all closed in, with panel doors decorated with linenfold carving.

Chairs were not common at this time. They were usually constructed of oak and were of a very simple design and strong. The chair backs were usually panelled and inlaid with choice woods or else they were carved with some simple conventional pattern. These chairs were still made until the end of the seventeenth century. They were roomy but not very comfortable. The hoop-skirt was in vogue at this time and no doubt had some influence on the design of the chairs. The structural features of some of the chairs were awkward and heavy and sometimes there were large masses of carving crudely wrought but the general effect was rich. Other types of English chairs were composed principally of turned work. These could be made very cheaply and no doubt accounted for their popularity.

For the privilege of using the photograph shown the writer is indebted to the courtesy of the Metropolitan Museum of Art of New York for figures 2, 4, and 5, to the Hayden Furniture Co. of Rochester, N. Y., for Figure 1, and to the Pennsylvania Museum and School of Industrial Art of Philadelphia for Figure 3.

BUILDING AN IRON FENCE

L. F. Biesemeier, Supervisor of Manual Training, Kenilworth, Ill.

PROBLEMS of construction that have real worth and educational value as well as being a genuine community need are not always applicable to many school shops.

It was a double purpose that led up to the building of iron fence in the shops of the New Trier Township High School. First, there was a real need of a suitable fence along the main walks of our campus to prevent students from making hard beaten paths across the beautiful lawn. Second, there was the desire of those interested in shopwork to make something that was of practical value and use about the school buildings and campus that would be a permanent, conspicuous example of high grade shopwork.

The detail construction on this fence was primarily intended to give the boys in forge shop practical experience in this kind of work, but it necessarily brought into active service the pattern shop, foundry, and machine shop to some extent.

The problem for the pattern shop was the making of patterns and core boxes for the fence post top, base, and intermediate post final.

The foundry was required to run the castings from the patterns made by the boys in the pattern shop.

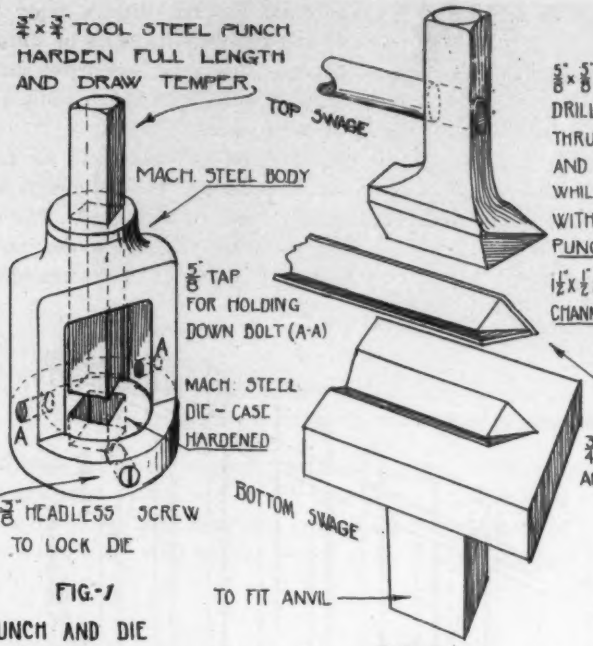


FIG.-1
PUNCH AND DIE
DETAIL

FIG.-2
TOP AND BOTTOM SWAGE

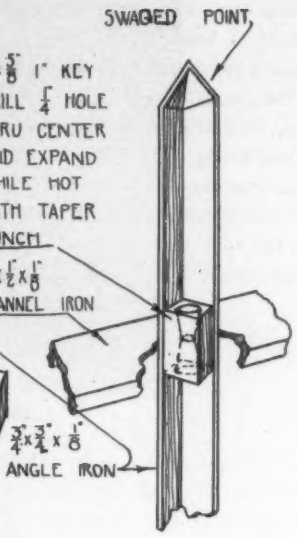


FIG.-3
FASTENING PICKETS
TO CROSS MEMBERS

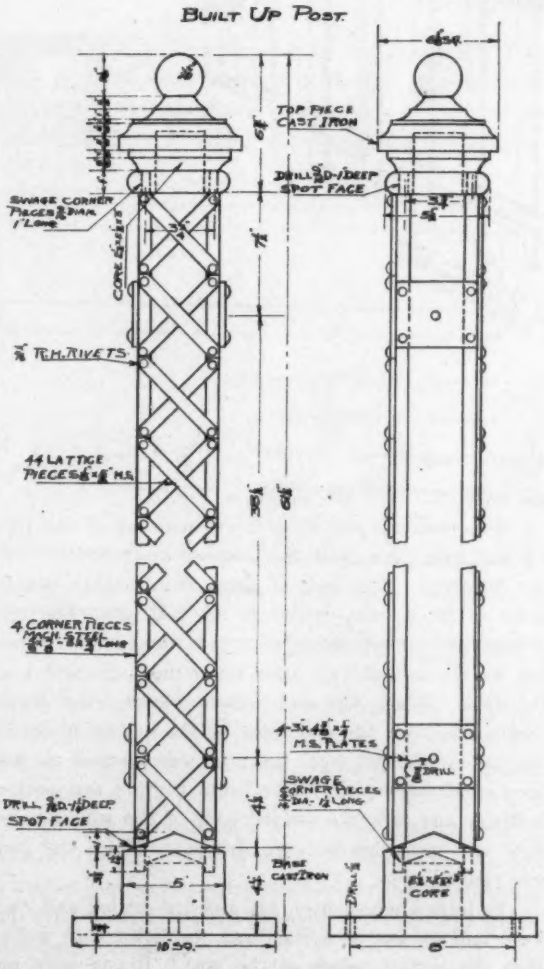


Fig. 4. Details of Post.

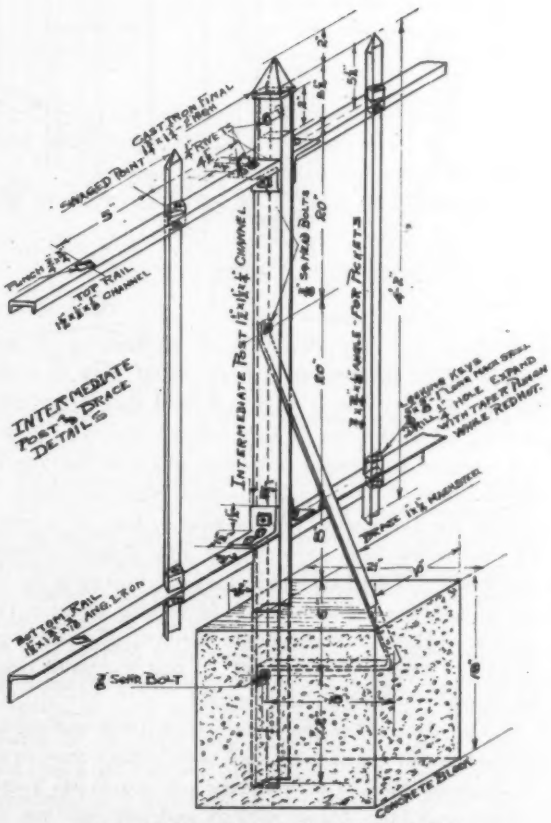


Fig. 5. Details of Fence Posts and Concrete Base.

While the work done in the pattern shop and foundry was not difficult, it was found to be especially suitable for second and third year high school boys, embodying as it did in the pattern making the principles of turning, mitering, building up, draft, split pattern, core prints, and core boxes.

The fence post top and base are excellent foundry problems for green sand moulding, making use of the principles of the split and solid patterns, the overhung and suspended core, risers, proper venting, etc.

panded, while red hot with a taper punch. When cold the key was fitted in place by filling or grinding, then removed, heated red hot, driven into place quickly and expanded with taper punch while a heavy backing bar held it in place.

The small angles which hold the fence sections to the posts were riveted on after pickets were assembled. For completed section see Fig. 6. The method used in fastening the fence sections to the intermediate posts as well as the details of the intermediate post, brace,

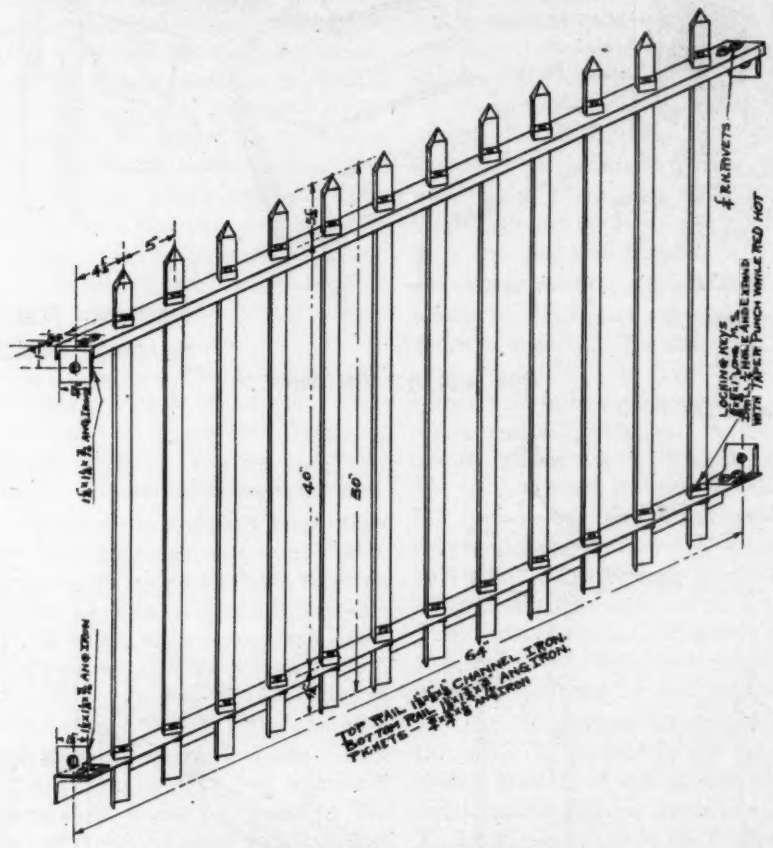


Fig. 6. Completed Section of Fence.

There was no power punch available so it was necessary for the boys in machine shop work to make the punch as shown in Figure 1, and this is the only part of the work done by this department. The punch was fastened to a swage block and was used for punching the holes in the top and bottom cross members.

In the forge shop pickets were swaged to a point, by the use of tools as shown in Fig. 2 and a sledge and anvil. The pickets were first cut to length by the use of a power hack saw or cold cutting chisel. The corners on the end to be pointed were cut off at an angle of 45° to remove surplus stock so that the point could be properly formed by the swages.

The assembly of the fence into sections was accomplished by the use of a jig, and then pickets were keyed in place by the use of a square key which has a one-fourth inch hole drilled thru it and one end was ex-

and cast iron final are shown in Fig. 5.

The built up post (Fig. 4) is made up of cast-iron top and base piece, with four, square machine-steel corner members. The ends of these members are swaged down to enter holes drilled in the castings. The top, bottom and corner pieces were held together for riveting by the use of two wood cross members and long tie rods. When top and bottom pieces were drawn down firmly on the shoulders of the corner pieces by the use of the tie rods, the post was squared up and then small holes were drilled into the top and bottom castings and thru the swaged ends of the corner members and steel dowels were driven in tight and hole was riveted over.

The lattice pieces were cut and jig drilled and then were laid on one at a time and the holes were drilled thru the corner pieces of the post. Rivets were put

THE FENCE AS SEEN FROM THE STREET.

into the holes to keep the pieces in place, but were not riveted until all had been drilled and fitted. The post was placed on an iron top table with the rivet heads down, then with a cup-point rivet set the lattice pieces were riveted tight.

The photograph show a section of two hundred feet of fence built and erected during 1919 and is the first installment of two thousand feet which will be built and erected in the next few years.

THE MAKING OF A GARDEN FORK

Thomas F. Googerty, Pontiac, Ill.

AT A, Fig. 1, is shown the drawing and size of stock for a garden fork. The fork should be made from spring steel. A fork of this kind is used in working around flowers and other plants.

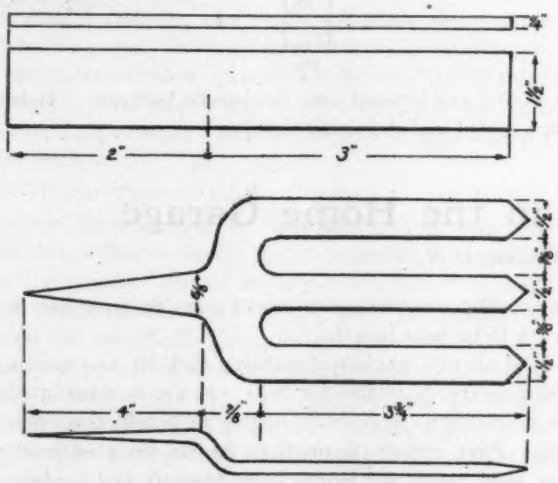


Fig. 1.

It is forged from one piece without any welding; this is sometimes called solid forging. In doing this kind of forging, the particular thing to guard against is a crack in the corners. In case a crack starts, it must be gotten out at once. This can best be done by filing, or cutting it with a chisel. A crack once started no matter how small, cannot be removed by hammering, and will show up in the finished work or will break when nearly finished.

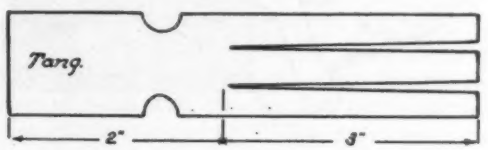


Fig. 2.

In making the fork, the steel is heated and split clear thru from one side, with a hot chisel, as shown in Fig. 2. The piece is then turned around in the tongs and the part to be used for the tang is fullered with a

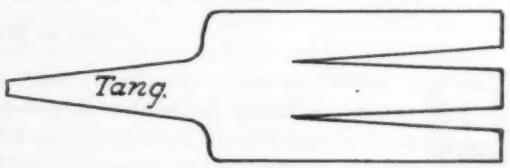


Fig. 3.

¾ inch fuller, as shown in the drawing. The stock at the end is drawn out roughly, to make the tang or part to go into the handle. (See Fig. 3). The piece is reversed in the tongs and hammered, as shown in Fig. 4, and again as shown in Fig. 5. Care must be taken to avoid a crack in the corner.

The surplus stock in the corners should be cut out with a curved chisel, as shown by the dotted lines in Fig. 6. The cutting is done while the piece is hot and the drawing of the chisel used is shown in Fig. 6. When the corners are cut out, the piece is hammered to look somewhat like Fig. 7. It is then formed over the horn

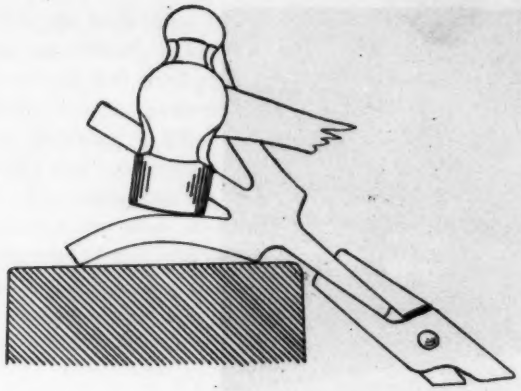


Fig. 4

of the anvil, the ends cut equal in length, and sharpened with a file. It is not absolutely necessary that the fork be hardened and tempered as spring steel is quite hard.

In hardening and tempering, it is heated slowly to

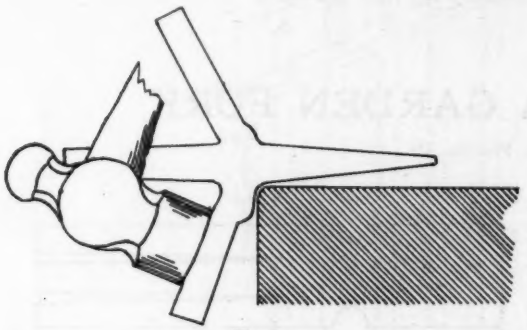


Fig. 5.

an even, dark red heat. It is then cooled in spurm oil, or lard and tallow mixed. When cool, it is held over the blaze of fire until the surplus oil takes fire and burns off. It is dipped again in the oil and allowed

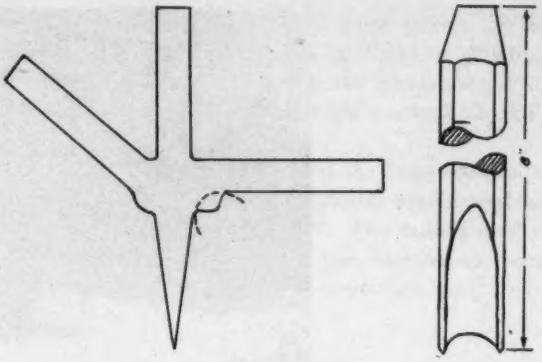


Fig. 6

to cool on the forge; it should not be cooled in water.

In attaching the handle, a ¼ inch hole is bored into the wood the full length of the tang. The tang

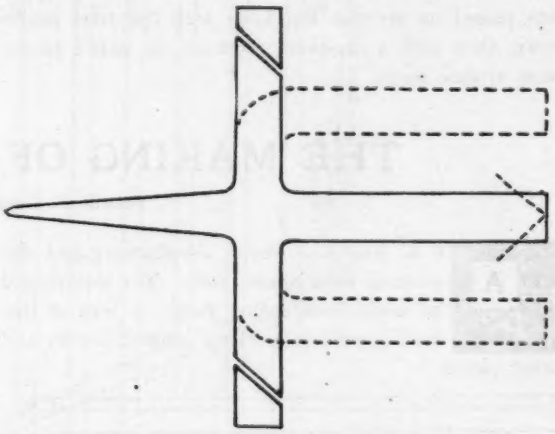


Fig. 7.

is heated and pressed into the handle part way. It is then cooled and driven in tightly.

Automobile Refinishing in the Home Garage

Ralph G. Waring, Syracuse, N. Y.

IN this day of high costs so many small car owners are facing the problem of refinishing their cars themselves, or else going without, that a recent inquiry shows the need for the present article. Let it be understood, in the beginning, that the work of refinishing a car is a dirty, tiresome, backbreaking job and that he who begins it must finish it. There are no short cuts of any practical value altho many farcical methods and materials are offered for sale of that type which P. T. Barnum used to say "was born every minute". The work need not be attempted at all unless light, heat and absolute cleanliness are constantly available, since the lack of any one may ruin hours of work. Furthermore, it calls for the utmost skill in brush work and the amateur, unless he is gifted with the patience of Job, had better think twice before he attempts to attack what misleading advertisements would seem to designate as a job to be done in a day.

With this wholesome warning then let us consider the primary operations for those who are so constituted or so trained as to desire to further undertake this problem. First, remove the top from the car, the windshield, the hood covers, all lamps, loose brackets and fenders. Remove the tonneau from the chassis and set aside on horses at a point convenient for work. Clean up all transmission and engine parts giving them a thoro overhauling before attempting to do any work in the paint room. When this has been accomplished take a stiff vegetable filler, scrubbing brush, a pail of gasoline and benzine mixed and very thoroly clean up the chassis, transmission and all other parts which may have become spotted or coated with road grease, tar and dust. Repeat the scrubbing operation with boiling golddust suds

and slush off with plenty of running water, using the brush constantly ahead of the hose. Run the chassis aside to dry. In case the body is badly scratched, cracked, or with bare spots it will be necessary to entirely strip the finish from the metal body by the use of varnish removers, scrapers and sandpaper. Avoid the use of a blow torch since its heat is quite likely to warp the metal panels and open up soldered joints. Above all else avoid the use of an open flame in a closed room, where gasoline or benzine is being rapidly evaporated from any surface of appreciable area. The body, cowl, hood covers and fenders should be cleaned down to the white metal and sandpapered to a bright, scratchy surface with No. 1 paper. In the meantime the running gear and chassis will have dried, the clips on the springs should then be loosened in order that graphite may be forced between the leaves and new lock pins placed in the joints to replace those worn by driving in the past. Following this the spring clips should be tightened again, the cotter pins locked in place and everything made ship shape. The old varnish should be scraped off of the gear and wheels, and everything cleaned up smooth and true, absolutely free from all dirt and oil.

Before any varnishing of any kind is attempted absolutely all cleaning, sandpapering and dusting off should be disposed of. The room should then be thoroly cleaned and some means provided whereby a frame of building paper or similar material be suspended over the varnish work to prevent any dust particles from sifting down from the ceiling or roof. The floor should be sprinkled lightly and carefully swept up, followed by careful mopping and oiling. If space permits, the varnishing work should be done in a room entirely separate from all other operations, otherwise the cleaning must be renewed previous to varnishing for the next coat. This brings us then to a choice of materials for the finish.

Either Pratt & Lambert, Valentine Co., Murphy Co. or Edward Smith Co. varnishes may be used, but whichever line is chosen use all materials as supplied by one company and do not attempt to mix them without expecting disastrous results, since each manufacturer has specifically designed each product to fit the needs of preceding and following materials. The first coat to be applied to the bare metal surface will be the *metal primer* which should be laid on with a good Fitch or Badger flowing brush, 2 or 2½" width. Let it be understood in the very beginning that at least four good brushes must be bought, each cleaned free of dust and kept suspended in turpentine until ready for use and that each brush should be kept separate from all others. This is best accomplished by securing cans with tight fitting covers, punching holes thru the center of the top and boring a hole thru the brush ferrule so as to permit a nail being thrust thru the hole in the ferrule against the can lid and thereby suspend the brush in such a manner that the bristles clear the bottom of the can by at least an inch.

In applying the *metal primer* follow the directions of the manufacturer as to thinning, remembering that this material is not to be brushed on as a heavy coat, but from one to three medium thickness coats. Allow sufficient time between coats to insure rock hardness, when cut down each coat as smooth as possible with No. ½ paper, using the hand and no pad or block. When the body has been well covered with the metal primer and carefully sanded down, it should be followed by at least two coats of *rough stuff* which should be applied so as to dry very hard. For right-handed operators it is customary to start at the right-hand end of the left side of either the cowl or tonneau and lay on the material in strokes parallel to the floor, working from left to right and from unfinished to finished portions. Each coat of rough stuff should be sandpapered smooth and level, after which the *putty coats or glazing coats* should be knifed on with an inch and a half flexible knife over the entire body so as to completely level up all the minute inequalities of the surface. This material should also be allowed to dry very hard and then carefully sanded down. Follow this glaze coat with another coat of rough stuff which, when dry and hard, should be water rubbed with a fine grain *rubbing stone*, manufactured for this purpose. As a result practically all of this last coat of rough stuff will have been rubbed off since it was applied merely to act as a guide coat. The surface around mouldings and panel lines should be cleaned off with a stiff felt pad or block to a perfectly true surface. When dry, clean off and apply two coats of rough stuff, allowing each coat to dry hard, then rub up the last coat with felt pad, O pumice stone flour, and water, being careful to sponge off when thru. Be sure that all surfaces are absolutely level, free from any tiny lumps or nibs. When dry make up a "tacky" cloth by wringing a piece of cheesecloth free of varnish, shaking out, and then using as a pad to carefully clean up the entire surface. Now lay on a good, even coat of *ground color*, prepared for this purpose, using a two inch camels-hair brush. Great care should be exercised on this portion in order to get an even application of color upon which the beauty of the car finish depends. For all small cars such as the Ford, Dodge, Saxon, etc., no color other than black should be considered, since any brightness of tone will greatly cheapen the looks of a small machine. With the larger cars, however, black, Brewster green, dark maroon, or tuscan red offer very pleasing shades. Sand the ground coat carefully with a 00 sandpaper and if necessary apply the second color coat, then rub down carefully with felt pad, FF pumice stone, flour and water. Clean up carefully after this last ground coat and apply a coat of *color varnish* in full body. When dry and hard this should be rubbed with a felt pad, pumice stone and water and a second color coat given. This last must be rubbed to an absolutely perfect surface, and when properly cleaned up, should be followed by a carefully brushed on coat of clear *wearing body varnish*. In order to avoid dust

specks in this last coat the brush should be used on other jobs of clear varnish work, for some time in order to work out loose bristles and brush makers' dust. In case small specks of dust get into the varnish during its application they may be removed immediately thru the use of a match stick whittled to a very long needle like point, or by dipping a heavy string into varnish and hanging it up in such a manner as to allow the varnish to drip down in long threads and harden for a week or more before using. By pinching out one of these varnish threads or "fat pencils" as they are called in the paint shop, a speck of dust in the varnish may be touched with the pencil and quickly removed thereby allowing the fresh varnish to flow back into place. The coat of wearing body varnish should not be rubbed but left in the gloss.

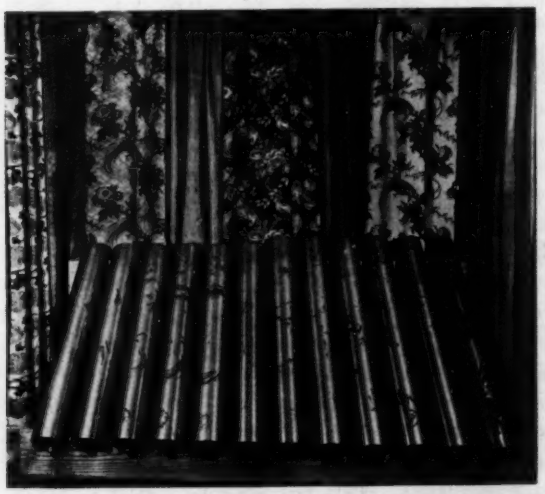
In the case of the hood, this procedure should not be followed but a special *hood enamel* must be employed in order to make allowances for the heat to which this material is subjected. The chassis and running gear must be protected with metal primer and rough stuff coats and two or three coats of special *gear varnish* which has been designed to withstand the abuse of gasoline, oil, tar and road dirt. The cushions, if of black finished leather, may be renewed as to finish thru the use of a top and cushion dressing,—the best grade of this class of material on the market. It should also be applied to the car top, whether of imitation leather or mohair. Avoid all of those renewers of an oily nature, since in hot, moist weather they gather dust and will eventually ruin the material to which they are applied.

The essentials necessary for good results are light, heat, and cleanliness at all times. Thoroness in the preparation of the foundation coats will eliminate much hard labor in the color varnish coats. Nothing may be slighted without causing increasing trouble as the work proceeds. Good brushes are absolutely essential to good work and should be respected and taken care of at all times. Be clean, do clean work in a careful, thoro, workmanlike manner, slight nothing, use good materials, according to directions. Above all be patient if you desire to have a car worthy of your pride and your friends' admiration.

THE PROCESS OF TEXTILE PRINTING

Jean Paul Slusser, New York City

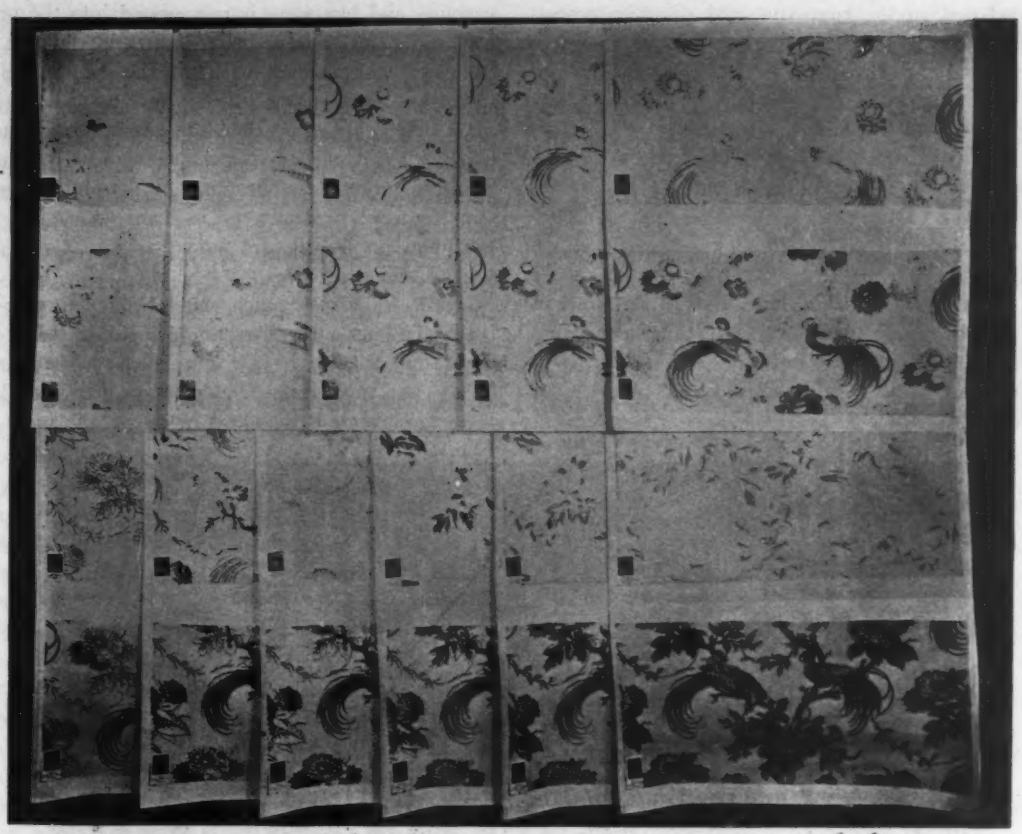
THE extraordinary success of American textile design, in its recent development since the beginning of the war, has aroused a widespread interest in the subject among teachers and students of industrial art. Information as to the exact nature of the processes of textile design and manufacture is consequently in great demand. As the process of printing cretonne is typical of the operations involved in producing printed textiles of any sort, whether of cotton, linen or silk, the following account of the printing of a cretonne, as carried on by Marshall Field & Co., in the manufacture of their Colonial Drapery Fabrics, may be of particular interest.



The engraved copper rollers used in producing the design are shown at the front. One roller is used for each color. Eleven rollers were used for the design at the extreme right. The twelfth was used for the dark background in the variation shown in the middle of the picture. Courtesy The American Museum of Natural History and Marshall Field & Co.

The first essential towards the creation of a textile is, of course, the original design as worked out on paper by the artist. This design is made as near as possible in size and color to the way the pattern is to appear on the printed fabric. The artist's drawing represents, of course, but a single unit or repeat of the pattern and inasmuch as the copper rollers used in printing the fabric have to be exactly covered with the etched-in pattern, the precise size of the artist's drawing will depend upon the size and circumference of the rollers. The rollers used in printing cretonnes are ordinarily 16 inches in circumference, and are engraved to varying widths, but most frequently to 32 or 36 inches. A unit of 16x16 or 16x18 inches is therefore a standard size for this kind of textile work. As will be explained later, however, the rollers, after having been used for one design, are pared down to receive another, so that their circumference is slightly diminished. Therefore repeats of an inch or so less than sixteen inches are also in demand. It goes without saying that the "repeat" unit must always actually repeat both horizontally and vertically in order to be ready for use.

The process of transferring the design from the artist's drawing to the copper rollers is by no means a simple one. First the design must be prepared for the pantograph machine. This means that, first of all, the design is transferred to sketch paper and carefully divided into squared sections. Every color or shade is



Showing various stages in the printing of a pattern. The first and third rows of samples show the separate color impressions as made by each of the eleven rollers used in this particular pattern. The second and fourth rows of samples show the cumulative effect of all the impressions that have been made to that point, including the one in each case directly above. The full eleven impressions are finally shown in the finished print. Courtesy of The American Museum of Natural History and Marshall Field & Co.

drawn in fine line and each section is enlarged separately by means of a camera, the enlargement varying from three to nine times the size of the original. After enlarging, each part of the design is redrawn with an outline of soft black color, and each part in the enlarged sketch is colored like the colors in the original design, so that the several sketches together form practically an enlarged facsimile of the original.

Next, a large, smooth zinc plate, ruled in squares corresponding exactly in size with the squares of the several sketch papers, is treated with a coat of varnish, and when it is sufficiently dry, the sketch is placed face downward on the plate and the back of the paper rubbed with a hand burnisher, which transfers the soft black outlines from the paper to the plate. An engraver then cuts out by hand the lines thus transferred to the zinc. In addition he must cut an extra line for each adjoining color, far enough away so that in the finished work these will just meet, neither lapping nor leaving a space.

After the cutting is finished, the zinc plate is scoured and the different parts colored to correspond with the colors in the original design. This enables the operator of the pantograph machine to distinguish the different shapes of each color to be traced on the copper roller.

The next main step is the transference of the design by means of a pantograph machine from the zinc plate to the copper rollers. A copper roller, previously covered with a resist varnish, is placed in a receptacle at the top of the machine, where it is engaged by diamond etching points on a carrier controlled by a needle in the hand of the operator. The zinc plate already referred to is fastened on the table of the machine, and the operator, being instructed as to the color of this roller, traces the outlines of all forms of that color by causing the needle to follow the engraved line on the zinc plate while the machine automatically reproduces an engraved line exactly similar on the roller above. The machine may be set to reduce the size in any desired proportion and may, at the same time, while the operator's hand follows but a single figure, be cutting a number of similar figures across the width of the roller.

The figures in the copper roller are now filled in with slanting parallel lines far enough apart so that after the rollers are etched to the required depth they will furnish just enough color to produce the desired shade. The grounding arrangement on the machine may be set to produce lines varying in density from ten to two hundred to an inch. A separate roller must be prepared for each color used in the design, and it is evident that every added color in the design results in

an added cost in the engraving and printing process. All rollers for a design must, of course, be of exactly the same circumference.

The etching of a copper roller by the pantograph machine does not prepare the roller for printing; it merely cuts thru the resist varnish so that the copper can be attacked by the acid bath to which it is then subjected. Prior to the acid bath each roller is thoroly inspected and any imperfections in the varnish painted out.

The roller is now lifted into the acid bath and the lines scratched into the resist varnish by the pantograph machine are etched into the copper to the required depth. The varnish is then washed off with turpentine and the roller carefully inspected. Usually some "pointing up" is necessary, and the work on the roller is then practically ended, except for polishing and facing to smooth the surface. The copper rollers are not discarded after having been once engraved, but when the design engraved on them is no longer desired for reproduction, they are turned down in a lathe, and polished thoroly with coarse and fine stones. Then these copper rollers, slightly smaller in circumference are ready for etching another design.

The rollers are now set into the printing machine, where each roller has its color-box and a "doctor" or steel blade which fits the roller closely and scrapes off all the surplus color, leaving the dye only in the etched parts. The fabric after proper preparation by singeing and bleaching is now passed into the printing machine. Here a large cylinder around which it passes brings it into contact with all the copper rollers in succession, each one of which prints upon it its proper color. After printing, the cloth passes to a drying machine, when it is ready for the subsequent washing and finishing processes. The fabric is thoroly washed with soap, tentered, or drawn out to about its original width, calendered or ironed, and put up into rolls ready to be sent to the warehouses.

A certain very much smaller number of textiles, both cretonnes and silks, are printed by hand nowadays from wooden blocks very much as was practiced before the invention of modern printing machinery. Here the process is the exact reverse of the roller-printing process, the design being printed from surfaces in relief covered with dye instead of from etched-in hollows filled with color. The process is very laborious, as one block only is used for a color and all the applications of color are made by hand. It is therefore used only in the production of very exclusive and high-priced fabrics. Bolder and simpler designs, and a greater freedom of size and coloring of the units employed, are ordinarily characteristic of hand-blocked designs. Furthermore the slight inaccuracy of register inevitable with even the most skillful manipulation of the blocks gives such fabrics a charm seldom associated with the ordinary machine process work.

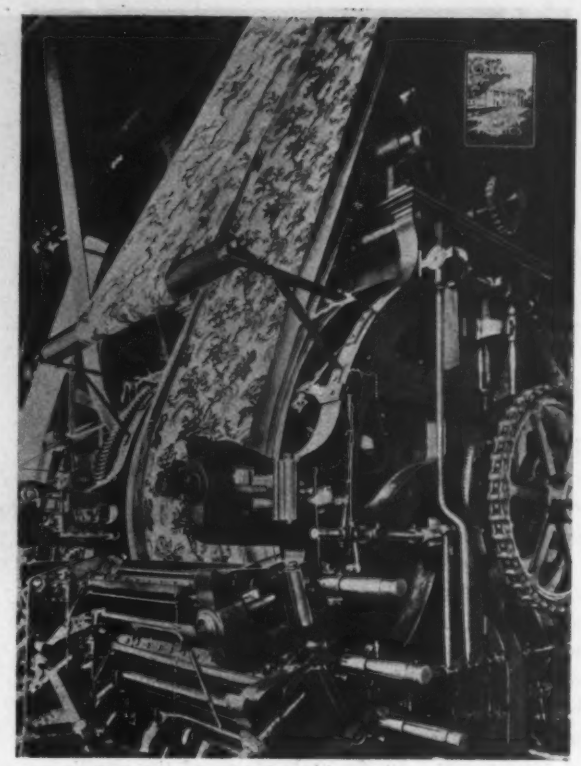
By the process of printing from engraved rollers

BLOCKPRINTED CRETONNES.
A series showing the batik original by Nell Witters and the simple and accumulating prints. Several color combinations are shown. Below are seen the blocks used in printing. Courtesy of The American Musem of Natural History and Marshall Field & Co.

effects of extreme accuracy and detail and such as are characterized by the use of a large number of colors, have been made possible. This has been for long the bane of commercial design in textiles, just as similar improved machinery in other branches of design has proved a curse rather than a blessing to the artistic well-being of the industry in question. Everyone knows and is daily reminded of the depths, artistically considered, to which commercial lithography has descended, and of the era of hit-you-in-the-eye horrors in carpets and wall-papers we have only just begun to see the end. Your expertly trained old-fashioned designer in all of these lines, expertly trained in the mechanical possibilities of his own special work, that is, made it his proudest boast that with his machine he could produce for you a rose that looked like a rose and a cabbage that looked like a cabbage. Consequently painting, not to speak of photography, was put to shame, and for a certain era we proudly covered our walls and our floors with roses and cabbages that would have deceived the very worms and butterflies.

Nowadays, however, designers and with them the public, have begun to see a great light. Thanks to the revival of some of the hand processes and a study of the work of periods when good handwork was being produced, our designers have seen the folly of realistic decorative design, and have returned, machinery and all, to a simpler and artistically better type of design. They are now using the machines to their own artistic purposes instead of letting the machines carry them away to unheard of depths of ugliness. Much of the charm of handwork is now being imparted to some of the newest of the American silks and drapery fabrics. A training in hand-processes such as wood-block printing, stencil, and batik, is indispensable nowadays as a preliminary training for the young designer of textiles.

And to the glory of the American textile industry be it said, that our more important textile manufacturers, in particular Marshall Field & Co., for cretonnes, and H. R. Mallinson, J. A. Migel, and Cheney Bros. for silks, are probably less bound by conservatism and tradition, more receptive towards the newer and newest ideas in industrial art, than any similar group of businessmen in America. That is why the younger generation of industrial artists may find, if it will, a real satisfaction in turning its talents to the account of this new and booming and very enlightened American industry.



A printing machine in operation. The finished fabric is emerging after having been passed successively under the eleven color rollers. Three of the rollers with their "Doctors" are visible in the lower part of the picture. Courtesy of Marshall Field & Co.

Commercial Efficiency in Manual Training

Don C. Bliss, Supt. of Schools, Montclair, N. J.

NOT long since a prominent schoolman in speaking of his manual training department stated that he would be entirely satisfied with a 25 per cent commercial efficiency on the jobs undertaken in the industrial department of his school. It was his conviction that the cost of any job carried out in the school shop was actually higher than the same job executed by a trained artisan, provided the school included in its estimate the cost of boy labor, supervision and general overhead, as well as of materials.

Since it is the business of the school to educate children, rather than to produce a commercially profitable output, no serious objection can be raised to the point of view indicated above if it be granted that efficient training does not necessarily involve commercial efficiency. Undoubtedly some projects are so valuable educationally that commercial efficiency can be forgotten. As a rule, however, this does not appear to be reasonable if we assume that it is the business of the school to prepare for life. Much less is it true under the assumption that school is not a preparation for life, but it is life itself. Reasoning from this point of view many school jobs instead of being a source of pride should be considered a cause of censure. Nowhere in business or industry are enterprises conducted for the sake of carrying them on. The businessman asks, "Is there a profit in this job?" Applying the same reason-

Boys Building Motors.

ing the school must ask a similar question relative to all projects that assume to be conducted on business lines. Unless this is done it would seem perfectly clear that the school is developing standards and ideals inconsistent with the experiences which are certain to come to the student.

No high school commercial department would succeed if it approved graduates unable to take dictation at a reasonable degree of speed or write accurate letters on the machine. Here the school standard and the commercial standard are approximately equivalent. To be satisfied with less than this in the industrial department, as in the commercial department, is to lose sight of time values. In the early stages of the pupil's experience some concessions can be made to the educational side of the training. This is only what the business world does. Undoubtedly many a clerk and office boy at first fails to earn his weekly wages, but the firm demands a steady improvement resulting in an ultimate profit to the concern or a vacancy soon exists. School practice has too often failed to conform to the standards indicated. An inevitable loss of prestige to the school has followed due to the failure of the industrial arts department to measure up to the expectations of its supporters. Financial support has been increasingly difficult to secure while the pupils themselves have shown an unexpected indifference to the subject. Such an outcome is by no means surprising, for children no less certainly than adults, are disinclined to expend efforts upon tasks that lead nowhere.

The manual training department of the schools of Montclair, N. J., has sought consistently to develop projects presenting a strong appeal to the pupils' interest which would, at the same time, show a product possessing a commercial value in excess of the actual cost when labor, supervision, and material were all included. Conditions in the community made it unusually difficult to carry out such a scheme.

No industries are maintained in Montclair as it is a typical suburban residence town. An unusually large proportion of the pupils are preparing for college so the vocational appeal is almost wholly lacking, reducing the work to a cultural or informational basis.

Careful records have been kept for several of the projects undertaken to determine to what extent they are commercially profitable. Rent and power are not included but the addition of this element would not materially change the conclusions. In computing supervision, instructors' salaries are reckoned on the basis of two hundred days, five days per week, and reduced to an hour basis.

Three distinct types of work for boys are undertaken:

1. *The craft type* or individual work in which the article is wholly designed and made by one person. This is the old fashioned type of manual training corresponding to the methods of manufacture before specialization took place. A parallel instance is the production of an entire shoe by the old time cobbler before the invention of shoe machinery gave the making of the parts to different individuals. This craft method of teaching still has its value in the variety of processes it necessitates and in the fact that it enables the boy to make useful articles for the home or school.

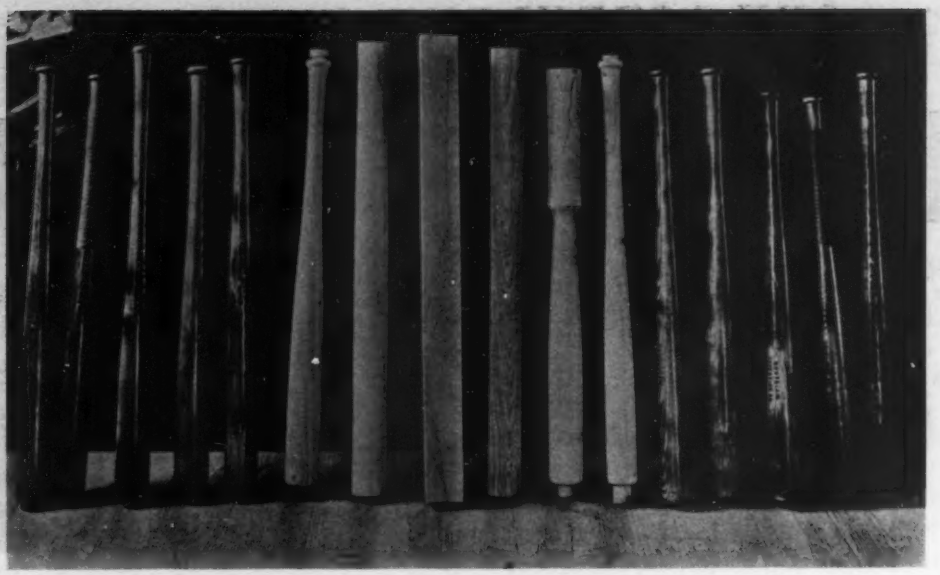
2. *The industrial type* or mechanical studies. These arouse keen interest and appeal to the scientific and inventive spirit. Steam turbines made from old tin cans are illustrative of this idea.

3. *The factory type.* This is the modern factory method and therefore a familiarity with it is an essential feature in the training for a boy's future career. Under this scheme many articles of the same kind can be made in a short time. The class is divided into groups with a foreman and each group is responsible for some detail of the finished product. All the parts needed for a set of tables can be furnished promptly and efficiently by the different groups thru the use of "jigs" which insure accuracy without the necessity for measurement each time. The parts are then assembled and the whole set finished at once. Two jobs of this character were the completion of 250 classroom tables and fifty shopwork benches. Exact figures for these two jobs are not available but the following data for several smaller jobs are typical.

Twenty Electric Motors.

Stock for twenty motors at $0.48	$ 9.60
180 hours' labor seventh-grade boys at $0.10	18.00
Supervision	12.00
Total	$39.60

HOMEMADE AUTOMOBILES.



Bats Made in the Shops. Steps in Turning Illustrated in the Center.

Value 20 motors at $3.00 each	60.00
Commercial profit	$20.40

24 Red Cross Packing Boxes.

24 hours' labor seventh-grade boys at $0.10	$ 2.40
1,000 feet of spruce	35.00
25 lbs. nails	1.25
Supervision 6 hours at $0.50 per hour	3.00
Total	$41.65
Cost per box	$ 1.73½

The Red Cross Headquarters charged $1.75 for a box of decidedly inferior material. A city carpenter offered to build the same box of equally good material and construction for $2.93 per box provided he was given an order for 100 boxes.

Six Shoe Cobbling Benches.

48 hours' labor seventh-grade boys at $0.10	$ 2.40
72 feet white pine	7.20
24 dozen screws	1.20
½ gallon paint	1.00
Carpet seat and tacks	.15
Supervision 2 hours at $0.50 per hour	1.00
Total	$15.35
Cost per bench	$ 2.56
Value of bench purchased elsewhere	$ 3.50

24 Surface Gauges.

90 hours' labor tenth-grade boys at $0.15	$13.50
Stock for 24 gauges at $0.07 each	1.68
Supervision	5.60
Total	$20.78
Value of 24 gauges at $1.75 each	42.00
Profit	$11.22

24 Riveting Hammers.

67½ hours' labor ninth-grade boys at $0.15	$10.12
Stock for 24 hammers	1.92
Supervision	4.20
Total	$16.24
Value of 24 hammers at $1.25 each	30.00
Profit	$13.76

Ninety Baseball Bats.

175 hours' labor eighth-grade boys at $0.12	$21.00
Ash stock at $0.19 per foot	38.25
30 hours' supervision at $0.50	15.00
Shellac and varnish	4.50
Total	$78.75
Value 90 bats at $1.50 each	135.00
Profit	$56.25

All or nearly all of the turning tools are used in the construction of the bats giving the boys good tool practice as well as eye training. A model is furnished but most of the laying out is done with the eye.

Necessarily many projects are undertaken in the manual training course that do not show a commercial profit. For instance, miniature motor and sail boats can be purchased at a less price than is represented by the time spent by boys and instructor. This is due to the fact that no commercial establishment would attempt to build them by the method employed. Here other values than commercial are frankly sought. The assumption is that the educational value to the boys makes up for the added cost. When a job is undertaken on a commercial basis, money and time values are reckoned closely but educational jobs cannot be put on the same basis.

An architect, during a recent conversation with a distinguished lady, endeavored to make out the case for present-day architecture. The lady listened patiently to his impassioned discourse, and then replied: "Architecture will never be the same as it was, because people have no conception of taste, and we are all losing the art of living gracefully." What can we expect when the people who commission architects fail to realize that scholarly architecture is the finest commercial investment? They have a better understanding of such things in America.—*American Architect.*

OXY-ACETYLENE WELDING

J. A. Starkweather, Asst. Supt. of Schools, Duluth, Minn.

UNDER the Smith-Hughes Act it is possible for communities to establish part-time classes for adults in which practically two-thirds of the total expense is paid from Federal and State funds. The City of Duluth has been taking advantage of the opportunities offered by this law for the education of adults by training them to become better workers in the trade or profession by means of which they are earning their living. One class which has been particularly successful is the part-time, dull season, class in Oxy-Acetylene Welding for sheet metal workers. The class was organized at the request of the firm, which had become acquainted with the workings of the Smith-Hughes Act thru other classes which are now being conducted in the city.

The class consists of fourteen men who have been employed in the sheet metal industry. The firm felt the need of training these men in the use of the Oxy-Acetylene torch in order to meet the competition in business of the present time. They felt that their men, while good in the sheet metal field, were unable to handle the torch. They tried first the experimental method but found that their men were not making as rapid progress as they should have made. The company called upon the board of education, who thru the vocational Education Director, made arrangements to establish an oxy-acetylene class on the following basis:

1. The class should consist of not less than twelve people.

2. The teacher should be a man thoroly acquainted with the trade both as to technique and science.

3. The men while taking the instruction were to be upon full pay of the employing company.

4. As soon as the skill of the men was such as to guarantee a satisfactory product, the men were to be placed upon productive work under the constant guidance of the instructor.

THE MEN AT WORK.
The Pile of Drums at the Back is Ready for the Rolling Bead.

Seams welded by men after four days' instruction. (Left) Welded drum after bead has been rolled in. (Middle) Drum bead welded. (Right) Welded drum before bead has been rolled.

5. The class was to be held nine hours per day for a period of sixteen days in order to comply with the Smith-Hughes requirements.

6. At least an hour and a half each morning was to be devoted to instruction upon related lines of science to give an intelligent understanding of the processes of oxy-acetylene welding.

An outline of the lectures follows:

Oxy-Acetylene Welding.

Lectures from one-half to two hours each morning. After first morning, examples of different class members both good and bad, discussed.

Lectures include the following outline:

Sources and Processes of Manufacturing Gases:
- **(A) Oxygen.**
- **(B) Acetylene.**

Equipment:
- **(A) Generators and Regulators, Blow Pipes, etc.**
- **(B) Types and Designs.**
- **(C) Maintenance and care.**

Flame Structure:
- **(A) Different kinds of flame.**
- **(B) How to obtain and maintain a neutral flame.**
- **(C) Results of using carbonizing and oxidizing flames.**

Filling Material:
- **(A) Kind of welding rods.**
- **(B) Why to use the best obtainable.**
- **(C) Sizes for different thicknesses of material and why.**

Preparation of Material:
- **(A) Effects of expansion and contraction.**
- **(B) How to offset effects of same.**
- **(C) Results in either case.**

Operation of Blow Pipes:
- **(A) Training a perfect cooperation of the hand and the eye.**
- **(B) Position of holding blow pipe and how to give ripple surface to sheet metal weld.**
- **(C) Penetration of entire thickness.**
- **(D) Adhesion or "freezing on" of the filling rod.**
- **(E) When and how to use filling rod.**
- **(F) Avoiding oxidation.**

Members of the Oxy—Acetylene Class

(G) Apearance of molten puddle, either when good or bad weld is being executed.

Test:

(A) Defects of tests—both chemical and physical.
(B) How to judge a good from a poor weld.

Characteristic Defects:

(A) The beginners' defects. (On the job.)
(B) The human error, etc.

Other Metals:

(A) Brief talk about welding other than sheet metal.
(B) Filling rods, fluxes, etc., to be used.

Oxy-Acetylene Cutting:

(A) Brief talk on the operation of the cutting blow pipe.
(B) What metals can be cut and which cannot and why.

Practice:

(A) Pieces of sixteen gauge to twenty gauge sheet metal used to practice on. Butt welds, angles, seams and flanges welded, and then tested by bending in vise until broken, and the defects pointed out to the individual operator. These exercises are repeated until creditable results are obtained, and then the operator is put on actual production work.

Reference Book: Autogenous Welding.—R. Granjon and P. Rosenberg. Purchased at Acetylene Journal Publishing Co., Peoples Gas Bldg., Chicago, Ill.

As an indication of the success of the work we were able to report that on the fourth day after the teaching began we were able to place ten of the twelve men upon productive work and while the speed of production was not great the percentage of spoiled work was almost zero. A period of one week between the time of the first and the second week's instruction elapsed in order to enable the company to make the proper installation of equipment.

The men who are learning the trade are delighted with their progress. The foreman of the factory is more than pleased not only with the increase in production which his shop is able to turn out, but with the very small loss due to faulty work. The product is very salable because of its good appearance.

STUDY SUPERVISORS' SALARIES.

A study of salaries of manual training and drawing supervisors has been undertaken by a committee of the Western Arts Association for the purpose of determining the amounts paid in representative communities. It is planned to compare the salaries of principals in order to determine, if possible, the relative importance which school boards set upon the services of these important classes of supervisory officials.

The following figures which have been taken from the salary schedules of medium size cities, are to be supplemented by figures to be gathered by the committee from all over the United States:

Salary List, 1918-19.

City.	Manual Training.	Drawing.	Grade Prin.	Per Cent of M. T. and Grade Prin. Salaries.
Newton, Mass....	3,700	2,600	2,850	29
San Diego, Calif.	2,400	1,600	2,004	20
Butte, Mont.....	2,450	1,700	2,000	20
Des Moines, Ia...	3,700	2,000	2,040	80
Albany, N. Y....	2,600	2,400	2,400	9
Youngstown, O...	2,100	1,800	2,000	5
Evansville, Ind...	2,150	1,550	1,800	19
Dayton, O.....	2,300	1,800	1,650	39
Sioux City, Ia...	2,200	1,550	2,000	10
Rockford, Ill....	1,800	1,600	1,150	50
Kalamazoo, Mich.	2,200	1,450	1,750	25
El Paso, Tex.....	2,400	1,325	1,800	33⅓
Springfield, Ill...	1,900	1,800	1,900	..
Springfield, Mass.	2,400	2,400	2,000	20
Average	2,450	1,828	1,953	25

Thru its chairman, Mr. F. H. Irons, 2210 Ogden avenue, Superior, Wis., the committee has issued an urgent request to supervisors and teachers for further information that will assist the committee in extending this study to cover the entire United States.

INDUSTRIAL-ARTS MAGAZINE

Board of Editors
E. J. LAKE S. J. VAUGHN

EDITORIAL

LEAVING THE PROFESSION.

It cannot be disputed that the temptation to leave the teaching profession is very strong. From the standpoint of remuneration, there are many fields which surpass that of teaching. From the standpoint of nervous energy expended, of restrictions imposed, and of wearing, continuous strain and labor involved, there is scarcely any line of work that compares with teaching. So, when a teacher is offered from fifty to one hundred per cent more salary in some other occupation, the first impulse is to take it; and the first judgment is that such a change is wise. We are not altogether sure but that the final judgement may be the same.

And yet, some interesting cases have come to our notice in the last few months of teachers who have been tempted by attractive salaries and who have declined to leave the teaching profession. Their reasoning was something like this. They had spent long years in preparation for and in pursuit of certain ideals of service. They had in those years experiences and friendships and satisfaction which money alone could not buy. They were loath to leave a calling in which they had won something of recognition and had at least made a start toward a successful career. Moreover, looking a decade or so into the future, or perhaps not so far, they were disposed to feel that the teaching profession still had some rich rewards both monetary and otherwise that would in the long run well repay the diligent and persistent workers in the educational vineyard. They practically said, "Well, I'll stay and help do the job that needs so much to be done in this time of stress and depend upon the public's sometime fickle sense of gratitude and fair play to give me the reward which merit and common justice demand."

We shall all grant that multitudes of fine idealists of the same sort have lived in the past, have struggled in a fine false hope for realizations which never came. And yet we put their names in the lists of those to be remembered. We honor them, but we do not condone the offense against them.

But there is a brighter, more hopeful view of this matter. The whole country is aroused over the almost criminal inadequacy of teachers' pay. Increases, altho hopelessly inadequate, are being made thruout the country. In numerous places increases are being granted as frequently and as generously as clumsy and inelastic tax systems will permit. Teaching will see marvelous developments in the next decade. Goodness knows there is room for marvelous developments in matters of salary, in preparation for teaching, and in efficiency of instruction.

Our advice is that before a successful teacher decides fully to throw over the business of teaching and to enter another field especially if he is actuated by the perfectly commendable desire to enlarge his income, —our advice to such a teacher in such a situation is to consider well his opportunities in other matters besides income, to estimate carefully the advancement that must inevitably come in the next few years in the teacher's work, and to decide whether by staying in the profession and exerting his energy he may not be instrumental in hastening the day of full appreciation of the significance of the teacher's work and of adequate returns for services rendered.

THE PART-TIME SCHOOL IGNORED.

If one were to judge from the silence of the Department of Superintendence on the question of the part-time school at its Cleveland meeting, one would conclude that this is neither an important nor a pressing problem. During an entire week of discussions involving almost every conceivable topic and reaching thousands of superintendents, principals, and other administrative officers, the part-time school was not mentioned except at one brief session which but a comparatively small number attended.

It seems incredible that so vexing and pressing a question as that which the new part-time laws in the various states have raised should be ignored in a national conference of educational administrators.

Twenty states have already adopted compulsory part-time instruction for working boys and girls. Some states place the age at from 14 to 16; some from 16 to 18; and others from 14 to 18. Other states will undoubtedly follow until every state in the Union will soon have a compulsory part-time law.

To understand the magnitude of the problem presented to school administrators, it is only necessary to mention the fact that in New York state alone the part-time law will force back into the schools 400,000 young workers—All these in addition to the thousands of part-time workers of greater age in the evening schools. If the same proportion should hold good thruout the country, we should witness the spectacle of four million boys and girls returning for from four to eight hours per week of instruction in the public schools.

When there are added the other facts that school facilities are already inadequate to care for the present school population and that the teaching force is hopelessly insufficient for the present needs and that it seems all but impossible to induce competent people to undertake the teaching of the part-time classes, it appears all the more distressing that school officials upon whom the responsibility must fall, should assume an attitude of indifference and complacency.

The part-time school offers the opportunity of a generation to do some marvelous service for those who

need it most. Incidentally, the schools have an opportunity to redeem themselves. Will the school people be wise enough and courageous enough to seize the opportunity? Let us hope.

WHILE THE IRON IS HOT.

PREPAREDNESS is a dead issue after the crisis. Locks are useless after the theft. Little need to shut the gate after the horse is gone. Such is the inevitable conclusion of those who suffer in silence and do not pronounce their grievances while the situation is most critical.

We almost put that odious word "strike" before our caption, but thought better of it, for we do not believe strikes are equitable weapons of defense for pedagogs, and we would not be misunderstood. But we have one suggestion to apply as the open season for teachers approaches. Those teachers who anticipate a change of position for next year should mark their services up to a proper standard of income.

This precaution will not only help them but may help the ones they leave behind, whose services are not so much under competition. And what is a proper standard of income? No price can be placed on goods that have not been measured in quality or quantity, but we feel safe in the assertion that no teacher may be accused of profiteering who gets all that he can for his services.

PRACTICAL RESEARCH.

EDUCATIONAL Research makes little appeal to the teacher in the classroom. Like the busy doctor who finds scant time for introspection and who is forced to reduce his practice to a standardized routine of pulse, pills, and persuasion, so the teacher must follow the schedule and depend on the scientific expert to discover mistakes.

We have before us an innovation in the first number of the *Journal of Educational Research*. A new educational magazine is not an innovation of itself; it is in the peculiar methods employed by the promoters of this magazine that there is hope of searching research and practical results. The announcement states, "Research for the sake of research we shall leave to others. What uses the teacher or supervisor have made or may make, of the findings of the experimentalist, what methods are transferable from the laboratory to the classroom and office, what workable means of meeting common needs have been developed under actual school conditions—these will be our chief concern. We shall seek contributions, not only from the leaders in research, but also from their followers—the practical school people."

This is interesting to the teacher who has been suspicious that his instruction has not been as effective as it might have been—and most of us have experienced that dilemma at one time or another. Like a will o' the wisp, the human mind will always baffle investigation, but there is much to be gained by carefully measured results of instruction to great numbers of pupils. The classroom teacher can secure the necessary data upon which to base conclusions that are worth while. Conclusions will require the cooperation of the psychologist and the teacher. Here is the opportunity for this cooperation, and we predict interesting and practical results from this organ of the National Association of Directors of Educational Research, published by the University of Illinois, Bureau of Educational Research.

SELF IMPROVEMENT COURSES IN ST PAUL.

Mr. George Brace, Supervisor of Manual and Vocational Education of St. Paul, reports that his entire corps of teachers, without a single exception, are taking some sort of self-improvement courses. They are improving the opportunities offered by their easy access to the state university and other higher institutions in the twin cities, and St. Paul's excellent evening schools.

This example of enthusiasm, ambition, and professional wisdom reflects great credit upon the teaching corps, the city of St. Paul, and the Supervisor, and is worthy of emulation by every city in the land.

SUPERVISION NEEDED.

Experience has shown that some principals and superintendents assume that they are not competent to make suggestions and otherwise supervise cooking and sewing classes. As a result, it often appears that the work is not adapted to home needs, the pace of the classes slow, and the general results unsatisfactory. Superintendents can and should supervise even if the technicalities are beyond them. The general principles of class management are the same in domestic science as in the ordinary classroom and laboratory. The domestic science teachers need the help and advice of the superintendent. It is fair to say that the attitude of "trusting the teacher absolutely" is a menace to the successful teaching of Domestic Science. The young teacher comes from the Normal School and University full of ideas and ideals. She finds that no one in the system takes any special interest in her work. Has she any incentive for trying out new ideas? Is it not rather reasonable to expect that she may settle down and do it the easiest way? Anyone interested in training boys and girls to meet life situations should be able to judge the work in clothing and food classes whether it is adapted to the needs of the community, of the individual families, and to the capabilities and needs of the girls.—*Wis. Educational Bulletin.*

INDUSTRY AND ART.

"BROADLY, the revival implies a rebellion against inutilities, a conviction that machinery must be relegated to its proper place as the tool and not the master of the workman, that the life of the producer is to the community a more vital consideration than the cheap production which ignores it, and that thus the human and ethical considerations that insist on the individuality of the workman are of the first importance."—*C. R. Ashbee.*

The Children with Some of their Furniture.

The Furniture in the Making.

TOO LITTLE

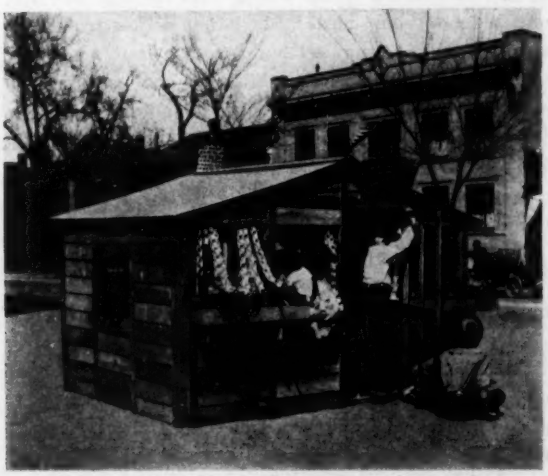
Hypatia Hooper, Denver, Colo.

PEOPLE look with a "show me" expression when told that kindergarten children built, with help from the teacher, the house here illustrated. They do not become convinced of the child's large part until, on being left alone with a child, they enquire: "Who made it?" and are given an answer in this spirit: "*Me* and Miss Hooper and the other kids!"

"Oh, and what did you and the other kids do?"

"Why, we made most all of it. We put on all the little boards and fixed the pieces over the windows and made the door and put the hinges on, only a big brother had to help with the bottom one because it was too near the floor, I hammered this nail and—I helped saw this board; I sawed nearly all of it!"

This house was made in Evans School, Denver, where the sloyd department is enthusiastic over joy for all children and instructors were glad to arrange for older boys to cut the half inch lumber into two and three inch strips for base boards, uprights and cornices, also the poplar for ridge pole and rafters. They also sent larger boys to "toe-nail" the window sills and to help adjust the roof which, along with rafters and ridge pole is fastened by nails inserted into gimlet holes—carrying out the "pin-hinge" scheme which makes the house collapsible; also buildable within doors and storable there too.



The Playhouse In Use.

Siding for this house came from the homes. The kindergarten children brought boxes and busily knocked them down.

In case this article should reach a home desiring to give children "something to do" during vacation, siding can be obtained and nails for same at any fruit grower's supply house. Apple box tops, peach or tomato crate tops and bottoms would be good.

The roof here illustrated is Composition board but canvas would stand moisture better.

A simpler form and large enough to give joy for private use, while much easier to handle, would be a house three boards square, with a roof slanting from front to back.

The original purpose of this article was to suggest a simple and inexpensive response to children's love for "doing something."

The house requires the direction of an older head, a seventh-grade child with public school sloyd training is old enough; but any age over four may be turned out to browse on nails, assorted, bent, rusting, large, small, bright, thin, thick; a hammer, a saw and "scraps"—sloyd department scraps are best; mill ends and boxes to "knock down" are full of possibilities. In this environment eyes grow bright and self-respect grows apace.

The furniture illustrated was made just that way—from boxes or from sloyd scraps.

The illustrations speak for themselves. But one article was entirely suggested by a grown up, the dresser—which is a peach box with strips nailed inside, to support cigar box drawers—the constructing was done by the children.

Sloyd people have no scrap "too little to keep." If the scraps may not be given to individual children and there is no near or desiring kindergartner, a cooperative scheme between shops and playgrounds would be fine—playground system to keep shops cleared thruout the winter and use the scraps thruout the summer.

To interested homes—a special mention that this house was "invented" by a mere lover of children whose knowledge of woods and tools was such that she was obliged to ask questions which will be answered for you by the nearest lumber merchant, or sloyd friend or carpenter. Without knowledge as to where your child's house is to be and what size and shape you are going to *help him make it*, this article can not deal with cost and quantity. It will not cost anything like its value in joy of making and using.

Whatever the wood, two coats of paint would add greatly to the children's pleasure of "doing" and be a preservative for both house and furniture.

NIGHT SCHOOL CLASS, AUTOMOBILE AND GAS ENGINE REPAIR, ROCK ISLAND, ILL.
Mr. A. W. James, Principal.

MACHINE SHOP COURSE OF STUDY.

M. McEllhiney, Emerson School, Gary, Indiana.

Qualifications for admission.

1. Minimum age, 14 years, with exceptions in special cases; such as extensive experience in other shops, over-age pupils with indications of machine shop ability, cases especially recommended by the Vocational Supervisor.

2. Minimum preparation; students should be physically able to perform the ordinary operations of the machine shop and should be able to perform reasonably well the fundamental operations in arithmetic. They should have had previous experience in pattern, forge, and foundry shops and be able to read blue prints, pertaining to ordinary shop practice.

Limitations of time.

1. Maximum length of class session; 180 minutes (shorter sessions will require a proportionately longer term for the completion of the course).

2. Number of class sessions per week, five.

3. Time necessary to complete course; from 1000 to 1500 hours, depending upon the ability and industry of the student.

Equipment furnished.

1. Minimum; equipment for a class of twelve includes the following:

Lathe, 14″.	Drill, 28″.
Lathe, 18″.	Sensitive drill.
Lathe, 11″.	Shaper, 26″.
Lathe, 22″.	Small tool grinder.
Milling machine.	Bench, 6 vises.

In addition, there is a proper assortment of lathe tools, mills, milling machine cutters, drills, reamers, mandrels, calipers, gauges, wrenches, and miscellaneous small tools.

Original cost of equipment at the present time would be $12,000.

Range of topics:

1. The student should be given an acquaintance with a wide field of information relating to the industry.

2. Topics for lectures and demonstrations should cover iron and steel and other materials used in the machine trades.

3. Description of the nature of fundamental processes.

4. Standards of workmanship.

5. Kinds and makes of tools.

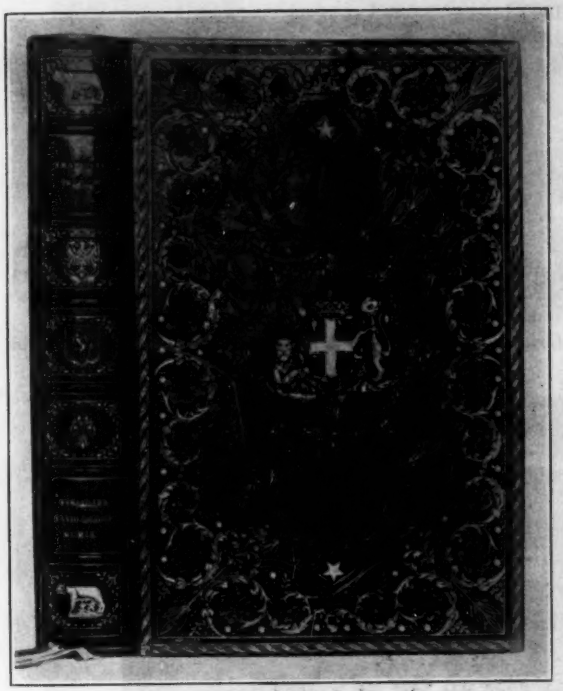
6. Study of the factory or shop in which machine work is the most typical process.

7. A comparative study of several related trades, or occupations.

8. Safety as related to the machinist's trade.

Trade processes that should be covered:

1. As a preliminary to the regular machine shop course, a short apprenticeship course is required, varying from 20 to 50 hours as follows: Bench work; Assembly work; Reading of blueprints; or sketches; Helper on various machines.



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THE ITALIAN COPY.

The Peace Treaty as an Example of Modern Craft Binding.

Fifteen copies of the treaty of Versailles, one for each of the allied and associated nations that affixed signatures to the ratification of the document, January 10, a year ago, have been distributed in hand made bindings by the supreme council of the League of Nations. On the front cover and backbone of each copy, excepting only that of Germany, is the device or coat of arms of the nation into whose archives it will go. The binding of the Germany copy is solid black, without a mark of any kind to relieve its appearance of gloom. The most ornate of the volumes is that of Italy. The device on that of Czecho-Slovakia, the infant among nations, consists of three plain letters and is the simplest of any volume, with the exception of Germany's.

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2. Lathe; 50 to 70 hours.

Study of speeds and methods of changing speeds, boring, general study of machine, cylindrical turning, threading, face plate turning, chuck work, turning to micrometer measurements and general repairing.

3. Shaper; 35 to 50 hours.

Vertical and horizontal cutting of rectangular blocks, clamping to avoid spring, angular work, bevels, keyways, and dove and tail joints. Relation of speed to the various grades of steel.

4. Milling machine; 70 to 200 hours.

Care and study of the construction of the machine, cutting plane surfaces at right angles surfacing and down cutting, angular work, hexagonal cylindrical work on centers, slab and indexing turning, gear milling, fluting of drills, taps, and reamers, spiral and oval milling.

5. Drill press; 35 to 55 hours.

Laying out work from blueprint or sketches.
Setting up work on press either by bars or vise.
Practice in lining work to a jig.
Use of drills, reamers, and boring bars.

Adapting speed to various sized drills and kinds of material.

6. Grinding; Universal and emery wheels.

Care and ways of setting wheels, also the grades of wheels.

Methods of setting and holding objects to be ground. Mills drills, chisels, etc.

General grinding work that comes in the shops.
Cylindrical grinding also taper setting and grinding.
Grinding to a micrometer measurement.

7. Planer; 50 to 60 hours,

The work of a planer is similar to the shaper work; there should be enough time given to the machine construction to be clear to the man or boy who is going to operate the machine.

Adjustment of the tools so as to get the best results.

8. Turret or screw machines; 60 to 100 hours.

The work on the turret or screw machines is in a way the same as any lathe; the proper methods of setting the tools and the relation of the speed to the grade of steel in use.

Problems: Bushings, nuts, washers, taps, bolts, screws, pins, punches, chisels, and general cutting off work that will take the place of sawing.

9. Bench work; 45 to 75 hours.

Laying out work, chipping, assembling, designing, and construction of small tools.

Fitting up bearings.

Designing and building small tools, jigs, and assembling parts after they have been machined. Relation of bronze, brass, babbit to lead or fiber and their adapted uses.

10. Tool designing and making.

Instruction in making lathe tools, boring bars, reamers, taps. This work is all micrometer work and should be the finished product of the boy after he has almost completed his work in a machine shop course.

After these tools have been made the student should be acquainted with the methods of hardening by oil, acid, and water.

Specialized trade course for machine shop for night school work:

Range of work.

The nature of this work demands to meet the conditions of the local city, and this should be made clear. Emphasis should be given to the important phases of machine trades, their relation to manufacturing and to other trades.

Practical experience.

After the student has proven himself competent he may, under the direction of the shop instructor act as his assistant or get practical experience in the outside shops.

Trade processes that should be covered:

Emphasis should be given to the practical work involving speed and repetition. and to planning and routing work so as to secure the maximum service from a given equipment. Processes taught should cover as much as practicable of the work of a skilled mechanic in the machine industries, including thread cutting, external and internal boring, straight and taper threading, tapering and fitting bearings and shanks, turning in brass and various metals, surfacing, slotting planing spurs, bevel, spiral cutting, worm, gearing cutting.

Suggestive projects:

Shop projects should follow as closely as possible the requirements of the industrial needs of the important industries, while keeping constantly in view the primary aim and purpose of instruction. The important thing is to gain ability to turn out good work quickly, rather than to emphasize the making of particular products. Wherever the making of a quantity of special articles contributes to the progress of the students, such work should be given a place in the school shop. However, the turning out of a manufactured product should not be permitted to jeopardize or delay the acquisition by the student of

the knowledge and skill for which the school shop exists. New tools for any school shop, scientific apparatus, various presses, machines, and devices of personal school equipment are suggested.

Parts of machines may be made, such as vises, lathes, gas engines, electric motors, small tools and supplies, wrenches, bolts, etc.

Should the school be fortunate enough to have some manufactor in the city who will supply the material for work and give some compensation for the work the projects will vary according to the work that the factory may send to the school shop for machining.

Nature of work related subject:

Drawing:

Freehand or sketching.
Lettering.
Make tracings and blueprints.
Reading working drawings.
Machine drafting and detailing.
Elementary drawing and design.

Science:

Physics.
Chemistry.
Topics relating to the production of iron and steel.
Composition and qualities of mild steel, tool steel, etc.

Mathematics:

Sufficient instruction for handling necessary computations, formulas, etc., such as common fractions, decimal fractions, percentage, ratio, and proportion, power and roots, and shop trigonometry.

This outline was worked out by the machine shop instructor and director of vocational work of the Gary School City, Gary, Indiana. This course may be modified by any school system to suit their needs and industries.

"HOW I HAVE MET THE HIGH COST AND SHORTAGE OF MATERIALS."

Garrah M. Packer, Diagonal, Iowa.

The close of the war does not seem to have relieved the situation of the scarcity of materials for the Manual Training department.

In the first place I found in the shop many pieces of lumber from the preceding year discarded as waste while in fact some of it was very usable. I planned the first part of my course in small projects but still tried to keep them useful and as a result we have utilized the scraps and bought very little new lumber.

Now we are ready for larger projects and want some nice hard wood which I found was not in the market in any quantity; what there was, was so costly I felt it was too expensive to buy.

This is what I did to meet the emergency and it proved very satisfactory last year and equally so this. It also proves to me that there must be much of such thruout the country if only hunted up.

There are many schools being consolidated thus leaving much old unused school furniture which has been discarded. Upon investigation I have found a great deal of it to be oak or some other desirable hard wood. This year it happens to be oak.

Again I have found both oak and walnut in discarded bedsteads, tables, and even in old houses builded in the early day but now abandoned.

Thru the cooperation and perseverance of my pupils we have gathered enough oak and walnut to supply the class the rest of the school year. The wood for the most part when brought into the shop looked like it would never be of much service. The contrary has proven true. Taborets, pedestals, writing desks, music cabinets and library tables are under construction and the wood could not be beat for its graining and fineness if we were to search all the lumber yards far and near The expense is only about a third of what it would have been if the lumber had been obtained from lumbermen.

The best of all, the class has learned the value of utilizing all scraps that accumulate in the shop and to look for and to save all hard wood that comes to their notice. Not only the class but the parents and others in the community have awakened to their wastefulness of the hard woods.

A BOY SCOUT MEMORIAL.

Love of country, optimism and hope triumphant over death are the keynotes of the plaque illustrated above. It was designed by Dr. R. Tait McKenzie, head of the Department of Physical Education at the University of Pennsylvania, and has been unveiled in Moose Hall, Philadelphia, to commemorate the former Boy Scouts of Philadelphia, who fell in the world war. Dr. McKenzie, who is a prominent sculptor, has been a leader in the Boy Scout Movement and his statue of "The Boy Scout" is the official emblem of the organization.

The alumni, faculty and students of the Emmerich Manual Training High School, Indianapolis, Ind., on February 18th, observed the twenty-fifth anniversary of the founding of the school with an appropriate program.

The institution took form as the industrial high school in 1895, later the name was changed to manual training high school, and finally in 1916 was given the name of Emmerich Manual Training School, in honor of the institution's greatest benefactor.

Since its organization, the school has grown in enrollment from 526 to approximately 2,000 students and the graduating class has grown from nine students to 225. The total graduate roll for the last 25 years is 4,378.

Mr. Emmerich, who died in 1911, was the first principal of the school and remained as its head until 1910, when he retired.

The Industrial Arts Section of the Oregon State Teachers' Association held its annual meeting December 28-30, at Portland, Ore. Prof. S. F. Swefard spoke on War-Time Manual Training.

At the business session, Mr. A. R. Nichols, of the Oregon Agricultural College, was elected president and Mr. F. M. Groshong of Portland, secretary.

Jefferson City, Mo. The class in building trades recently completed the erection of two frame garages, which included also the painting, concrete foundation and laying of the floor. During the winter, the class works in the shop preparing to undertake extensive building activities in the spring.

JOINT MEETING OF THE NATIONAL SOCIETY FOR VOCATIONAL EDUCATION AND THE VOCATIONAL EDUCATION ASSOCIATION OF THE MIDDLE WEST.

A notable meeting has just been held in Chicago. It was notable for the character of its program, for its large attendance, and for the fact that it was the first joint meeting of the National Society for Vocational Education and the Vocational Education Association of the Middle West.

The main topics upon which the energy of the convention were concentrated were as follows: "Vocational Education and the Present Economic Unrest"; "Vocational Education in Conjunction with Military Service"; "Full and Part-Time Vocational Education in the Secondary Schools"; and "Future Problems of State and National Administration of Vocational Education."

The programs of many of the section meetings were grouped around reports of special committees appointed a year ago by the two organizations. The committee reports were uniformly of a high order and were surprisingly exhaustive and well worked out. In addition, the presentations were vigorous and interesting and in decided contrast to the ordinary conception of a committee report. Evidently, those who were appointed to make the studies, investigations, and the subsequent reports took the matter seriously and made some real contributions to the subjects under discussion. As a typical example, the report submitted by Mr. Edwin A. Lee of Indiana may be mentioned. It presented an exhaustive analysis of the subject, "Conditions of Successful Vocational Training in High Schools."

As examples of reports that both in content and presentation merited the warm interest and enthusiasm with which they were received, the following committee reports may be mentioned: Conditions of Successful Vocational Training in High Schools, by Edwin A. Lee, Indiana University; Vocational Training for Women in Industry, by Cleo Murtland, University of Michigan; Effect of the Smith-Hughes Law on Instruction in Agriculture, by J. A. James, University of Wisconsin; Vestibule and Upgrading Schools, by James F. Johnson, New York; Vocational Education Requiring Special Schools and Equipment Independent of General Schools, by Arthur D. Dean, Teachers College (presented by Dr. Snedden); and Vocational Education in the Continuation School, by R. L. Cooley, Director Milwaukee Continuation School.

In general, the program may be characterized as a bringing together of reports of progress from all sections of the country. In this it marked a distinct advance over the programs of the past. For the most part, it has been necessary in the past to deal a good deal with prophecy and hopes. Now, vocational education under the recent laws has proceeded far enough to have proved certain contentions and disproved others, to have accumulated a certain amount of history, and to have established some facts and procedures that may safely be passed on as sound. In all the meetings, the unanimity of opinion was marked. Hence, there was almost a complete absence of the often heated, and sometimes bitter discussions, that were common in the earlier years of the two associations.

Among the exceedingly thoughtful and revealing discussions with which the meeting abounded, the following may be mentioned as typical: Training of Foremen, by Geo. E. Myers, University of Michigan; Vocational Training in Factories: Shall the State Foster It?, by K. G. Smith, Iowa State College, Ames, Iowa; Automobile and Gas Engine Repair on a Commercial Basis, by E. R. Snyder, State Director Vocational Education, California; and Organization and Administration of Unit Trade and Technical Schools, by L. A. Wilson, New York State Department of Education.

MR. WM. J. BOGAN,
Chicago, Ill.
President National Society for Vocational Education.

Just as no report of any meeting of the National Society would ever have been complete without mentioning Dr. Prosser, so in this meeting Dr. Prosser's voice was often heard and always to the enjoyment and enlightenment of all present.

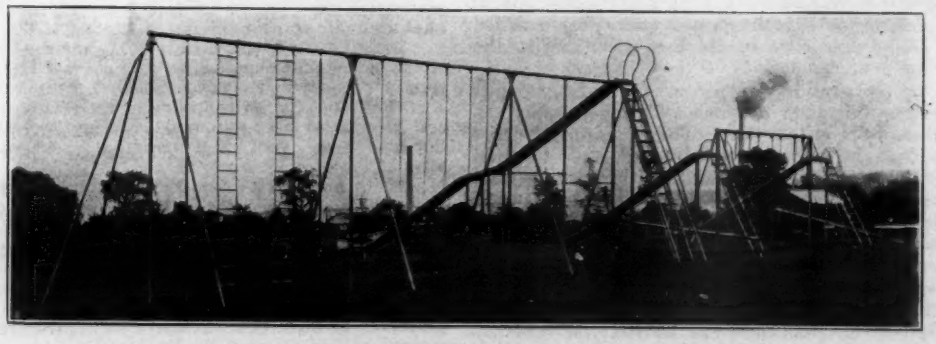
The commercial exhibits were grouped together in one large room on the same floor and very convenient to the meeting places. The commercial people seemed highly pleased with the arrangement and the meeting in general.

Chicago and the Hotel La Salle took care of the convention in admirable fashion. After the able management of the two presidents, Dr. David Snedden and Prof. C. A. Bennett, the next most commendable work was that done by local Chicago people, notably Mr. Bachrach, Mr. Bogan, and Mr. Bauersfeld.

The officers chosen by the National Society for next year include Mr. Wm. J. Bogan, Prin. Lane Technical School, Chicago, President.

Those chosen by the Vocational Education Association of the Middle West include Mr. Edwin A. Lee, Prof. of Vocational Education, Indiana University, President.—*S. J. Vaughn.*

St. Louis, and Kansas City, Mo., have made plans for extension courses for teachers in general continuation schools. Four weeks' summer courses will be offered at the Harris Teachers College and at the Kansas City Junior College for all part-time teachers in the state.



Playground Apparatus at the State Normal School (Model School Department), Oswego, N. Y. Built by Students of the Vocational Teachers' Department, Mr. Joseph C. Park, Director.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

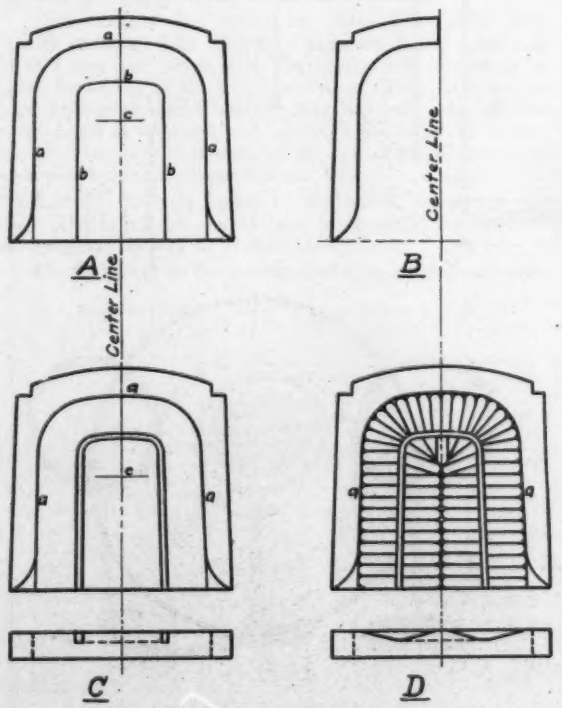
FORMING CHAIR SEAT TOPS WITH HAND TOOLS.

Joseph A. Shelly, Jersey City, N. J.

The forming of the upper face of a wood seat for a chair presents a problem that appears difficult of solution when uniform results are required from students engaged in quantity production. This task is comparatively easy, however, if the successive operations required to produce a nicely formed seat are carefully analyzed and each operation performed and completed in a logical order.

The first series of operations consists in laying out the lines that mark the limits of that part of the seat that is to be concaved or carved away. A center line is drawn thru the top of the seat from front to back and the outer line (a-a-a) A-Fig. 1 is laid out. The lines at the sides should be continued until they reach the front edge of the seat as indicated. When a number of seats are to be made, a templet B-Fig 1 should be used to facilitate the laying out of the lines (a-a-a) A-Fig. 1. This templet may be made of a piece of ¼″ stock but a suitable piece of tin or sheet iron will be found even better for this purpose. Line (b-b-b) A-Fig. 1 is drawn parallel to line (a-a-a) and is central between the center line and the line (a) at the front edge of the chair seat. To complete the layout the line (c) A-Fig. 1 is drawn equidistant with (a) measured from (b) on the center line.

When the layout lines have all been drawn, the seat is clamped to a bench top and a shallow groove is cut with a ⅜″ outside ground gouge thru the line (b-b-b) A-Fig. 1; the line is kept in the center of the gouge and it is, of course, obliterated when the groove has been formed. The groove is squared at the bottom and brought to the required depth by means of a router provided with a ¼″ cutter. The depth of the groove indicates the depth of the carved part of the chair seat C-Fig. 1.



Details of Method for Forming Chair Seat Tops.

To rough out the seats on this particular job, a 1″ inside ground gouge was used to cut in a straight line from line (a-a-a) D-Fig. 1 to the bottom of the groove, and from the center line and point (b) on the center line also to the bottom of the routed groove as at D-Fig. 1. Most of this rough cutting was across the grain except at the center at the back and on the curves where the cuts ran radially to the centers of the different radius.

An iron spokeshave with the face ground rounding or convex both ways was used to work the straight roughing cuts to a nice fair curve. Care should be exercised to prevent cutting outside of the layout lines or below the groove bottom that marks the depth. The spokeshave was ground on the face in such a manner that it could be operated both across and with the grain of the wood. The spokeshaving was tested by "feel" only as the lumpy spots and lack of fairness was readily detected with the fingers or the palm of the hand. A scraper with one edge ground to the approximate curve of the seat was used to give the final finish preceding the sandpapering.

It is sometimes required that the carved part of the seat be deeper at the back than at the front, in which case the groove may be routed to depth back of line (c) A-Fig. 1 and cut from a gauge line at the front edge of the seat. A ¼″ chisel is used to cut in a straight line from the gauge line to the routed depth.

A TICKET BOX.

W. H. Snyder, Jr., High School, Lakewood, O.

This ticket box was developed to meet a need in the lunch room of the Lakewood High School. It is used for the tickets which students purchase for lunch dishes.

The box is made in two parts: The bottom part is five inches in diameter and eight inches in height, the top is wired with a No. 14 wire, the longitude seam on the body is a ¼ inch groove seam. The bottom is double seamed to the body and a tin cup swedge is run around 2¾ inches from the top. This serves to not only stiffen it but also does away with the plain effect.

The top part is composed of a lid in which a flared piece is fitted. The lid is ¼ of an inch deep and fits on the inside of the body; the lid has a 2½ inch hole cut in the top, in which the flared piece is fitted. The flared piece is eight inches in diameter at the top, 3½ inches deep, and 2½ inches in diameter at the bottom. The top is wired with a No. 14 wire to stiffen it.

In a ticket box of this design, the tickets can be dropped in the box but cannot be taken out. When it is desired to empty the box, the lid is taken off and the box is emptied.

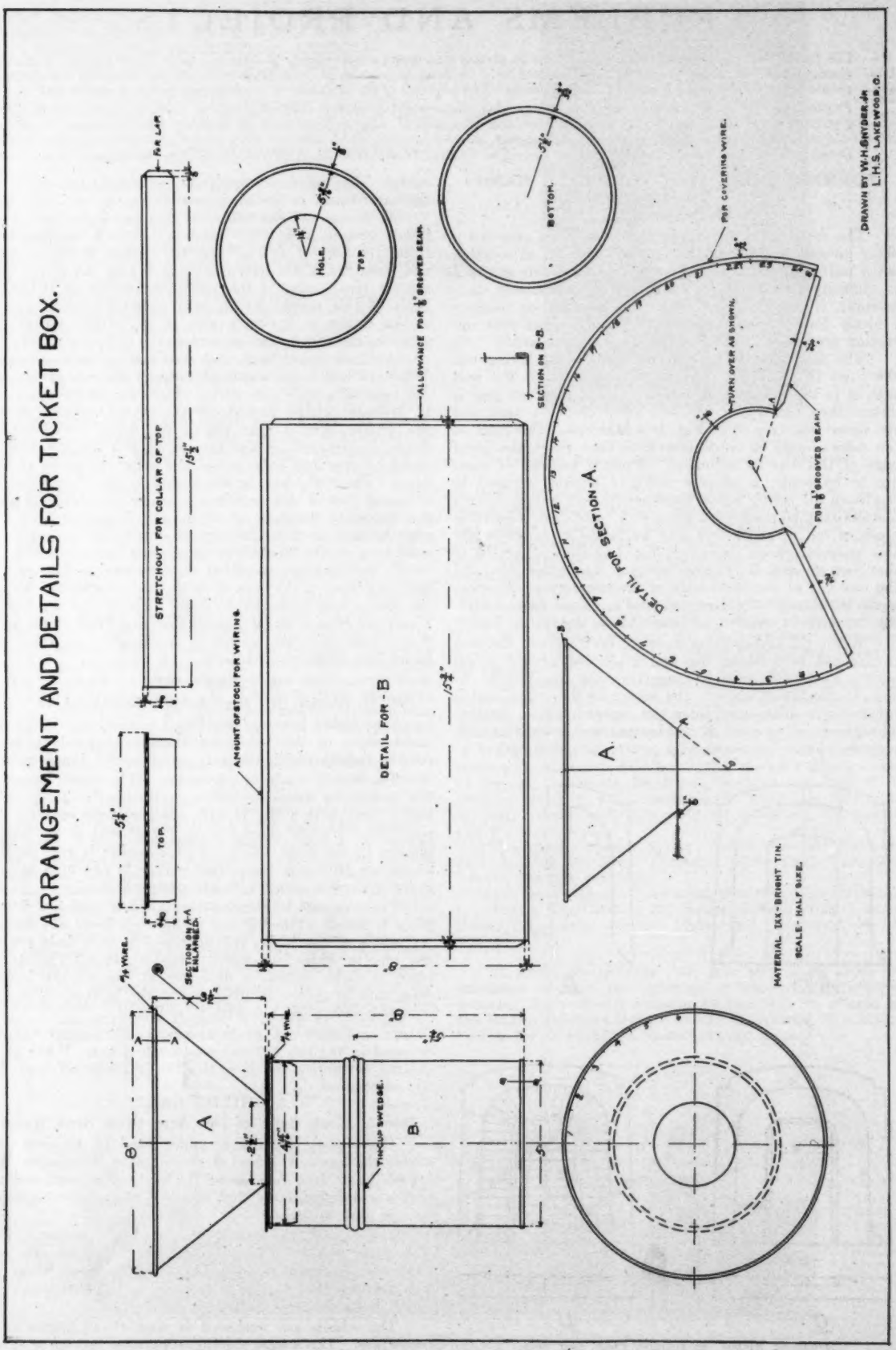
A CHILD'S CART.

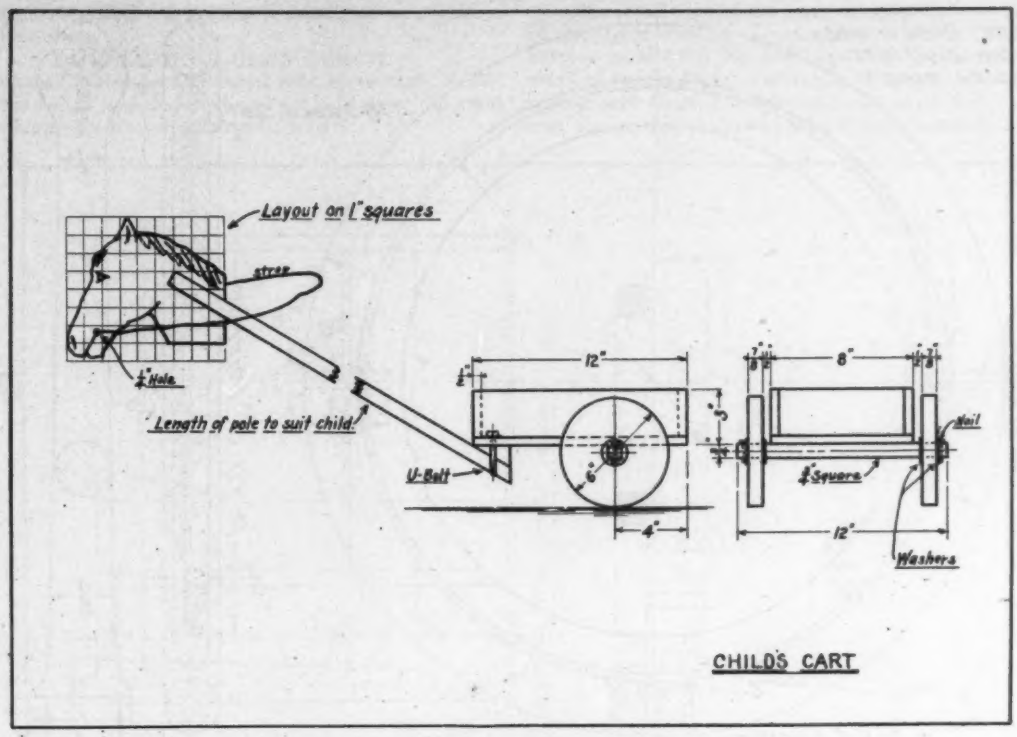
Don A. Sloan, Supv. of Ind. Arts, Great Bend, Kans.

This simple project is appreciated by children between the ages of 2 and 5 years, more because of the horse's head than because of the cart. The combination makes a delightful toy that any boy in the upper grades will be glad to make.

The box of the cart is made of ½″ cypress. The wheels are cut from ¾″ pine and the pole and axle are made of ¾″ hard wood. The head is also made of ¾″ material. The tongue is fastened to the cart with two nut U bolts.

The wheels are washered on and a nail serves as a cotter key. The wagon should be painted in two or three


ARRANGEMENT AND DETAILS FOR TICKET BOX.
STRETCHOUT FOR COLLAR OF TOP
FOR LAP
TOP
HOLE.
BOTTOM.
ALLOWANCE FOR 1/8" GROOVED SEAM.
SECTION ON B-B.
FOR COVERING WIRE.
TURN OVER AS SHOWN.
FOR 1/8" GROOVED SEAM.
DETAIL FOR SECTION-A.
AMOUNT OF STOCK FOR WIRING.
DETAIL FOR - B
TOP.
SECTION ON A-A ENLARGED.
3/16 WIRE.
TIN CUP SWEDGE.
A
B
MATERIAL TIN - BRIGHT TIN.
SCALE - HALF SIZE.
DRAWN BY W.H. SNYDER JR.
L.H.S. LAKEWOOD, O.



DETAILS OF CHILD'S CART.

brilliant colors and may be striped to suit the children's taste.

ADJUSTABLE SHAVING MIRROR.

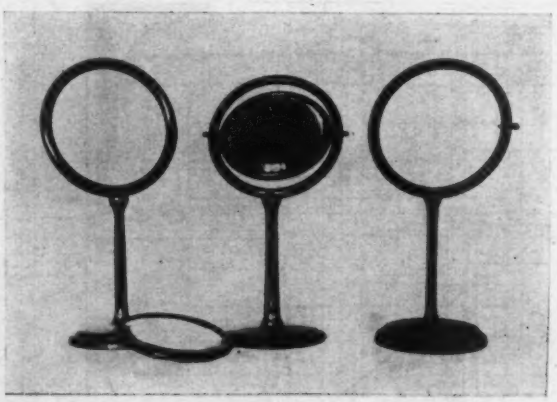
H. P. Gerber.

The accompanying design was evolved after considerable thought along this line. Special attention was given to adjustability, simplicity, good design, strength and lack of clumsiness.

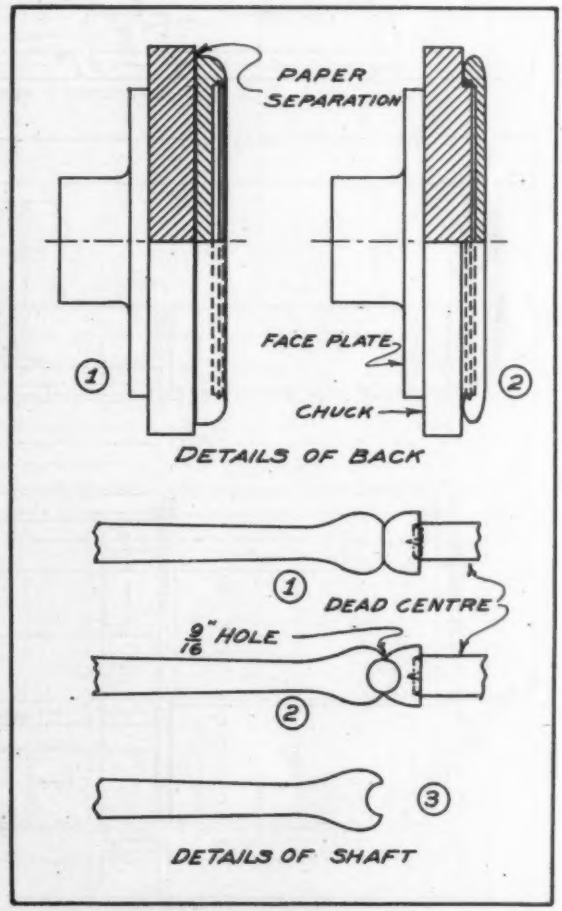
Both walnut and mahogany have been used with marked success. The ring and base are made from one piece of one inch stock, thus saving considerable stock in large classes. The stock is glued to a chuck with a tagboard separation and when the ring has been roughed the center piece is removed and mounted as before on a new chuck. The ring is completed on the original chuck by the method usually employed for this.

A 9/16" hole is bored in the shaft to receive the ring. The operation should take place while the shaft is held between centers as indicated.

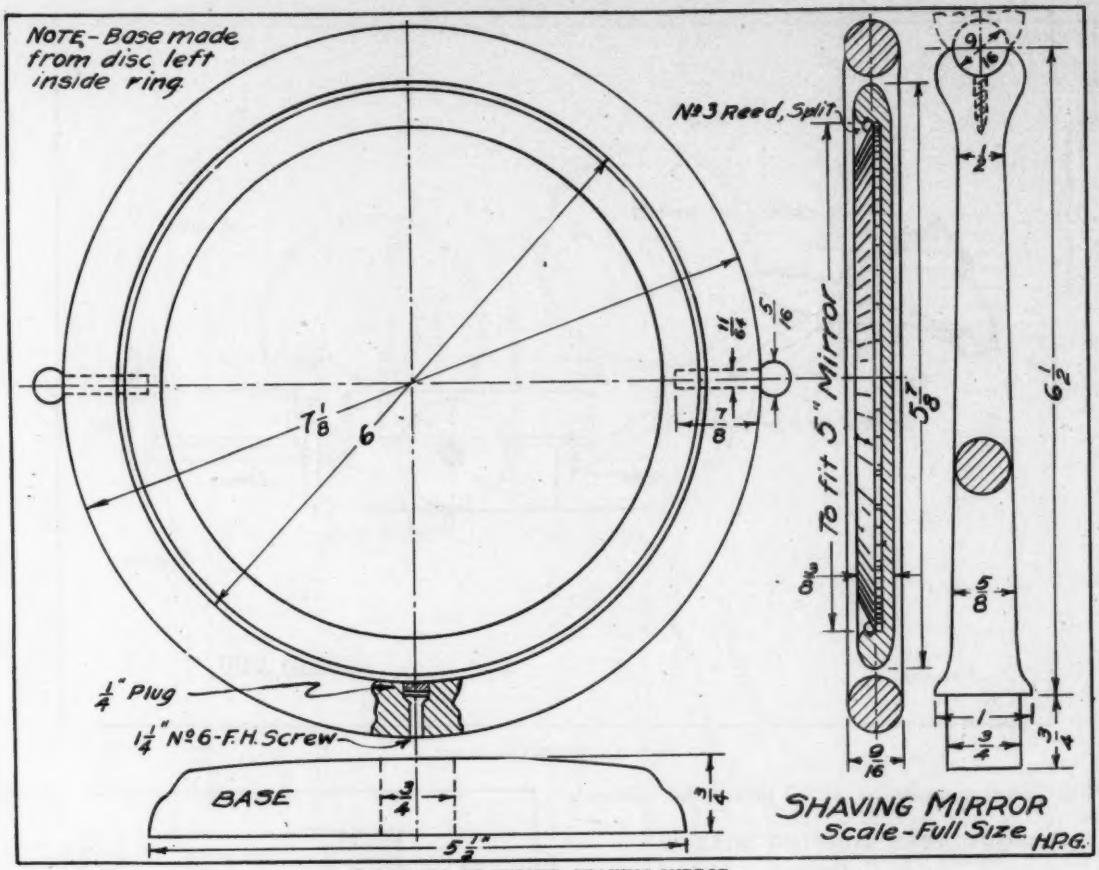
The finishing is done after the ring, shaft, and base



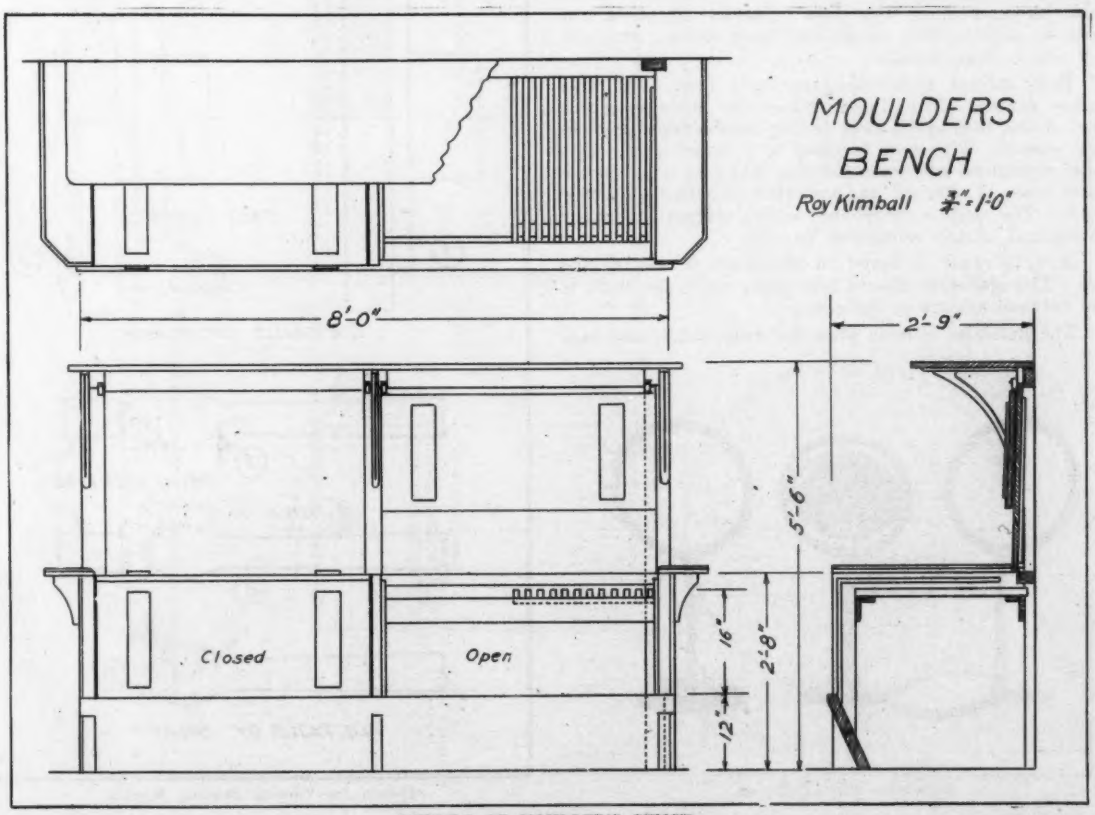
Adjustable Shaving Mirrors.



Details for Turning Shaving Mirrors.



DETAILS OF TURNED SHAVING MIRROR.



DETAILS OF MOULDER'S BENCH.

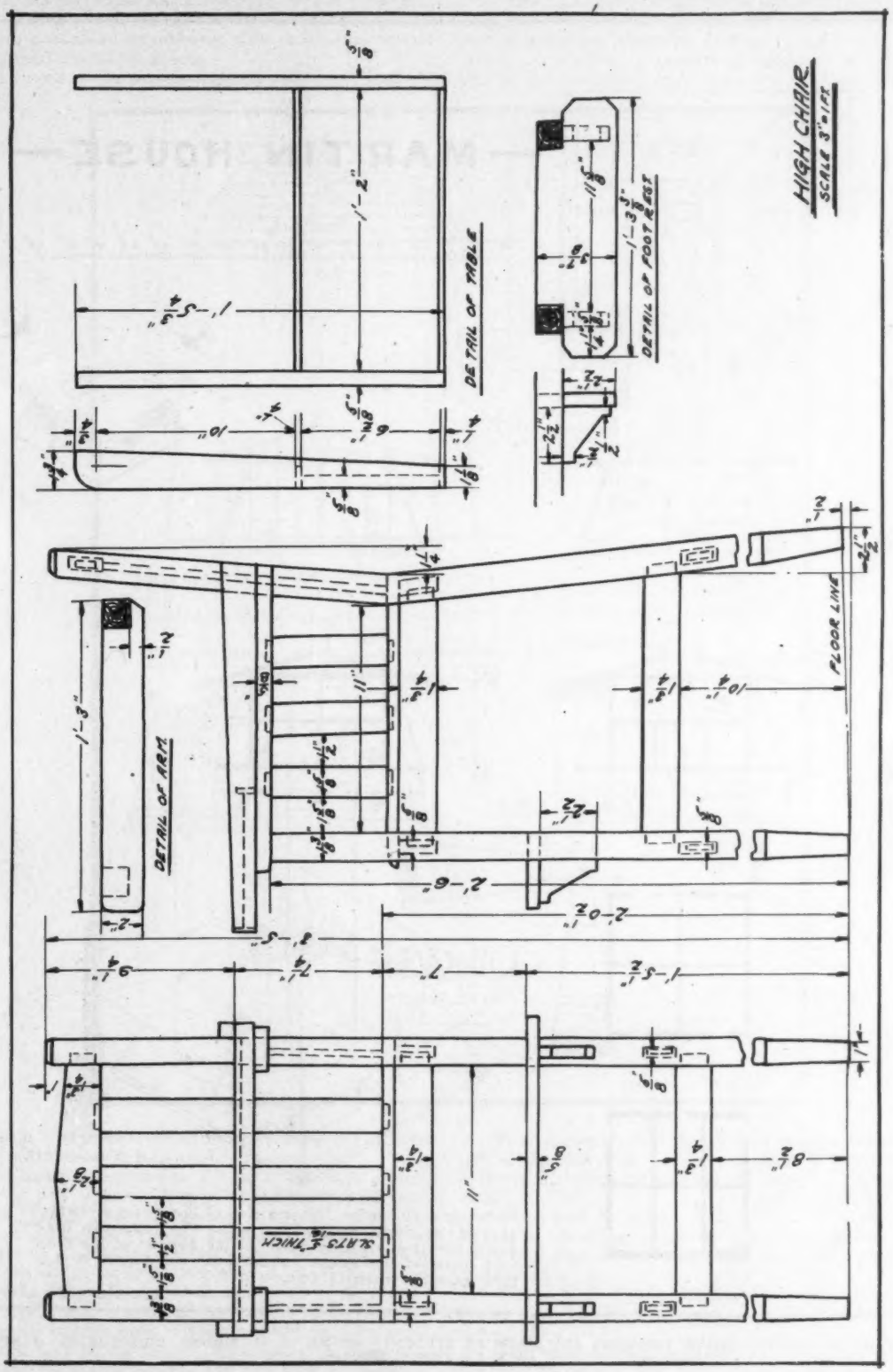
have been assembled. Mahogany is usually given a pumice rubbed finish.

DOUBLE MOULDERS' BENCH.

Roy Kimball, Instructor Mechanical Arts, Portsmouth, N. H.

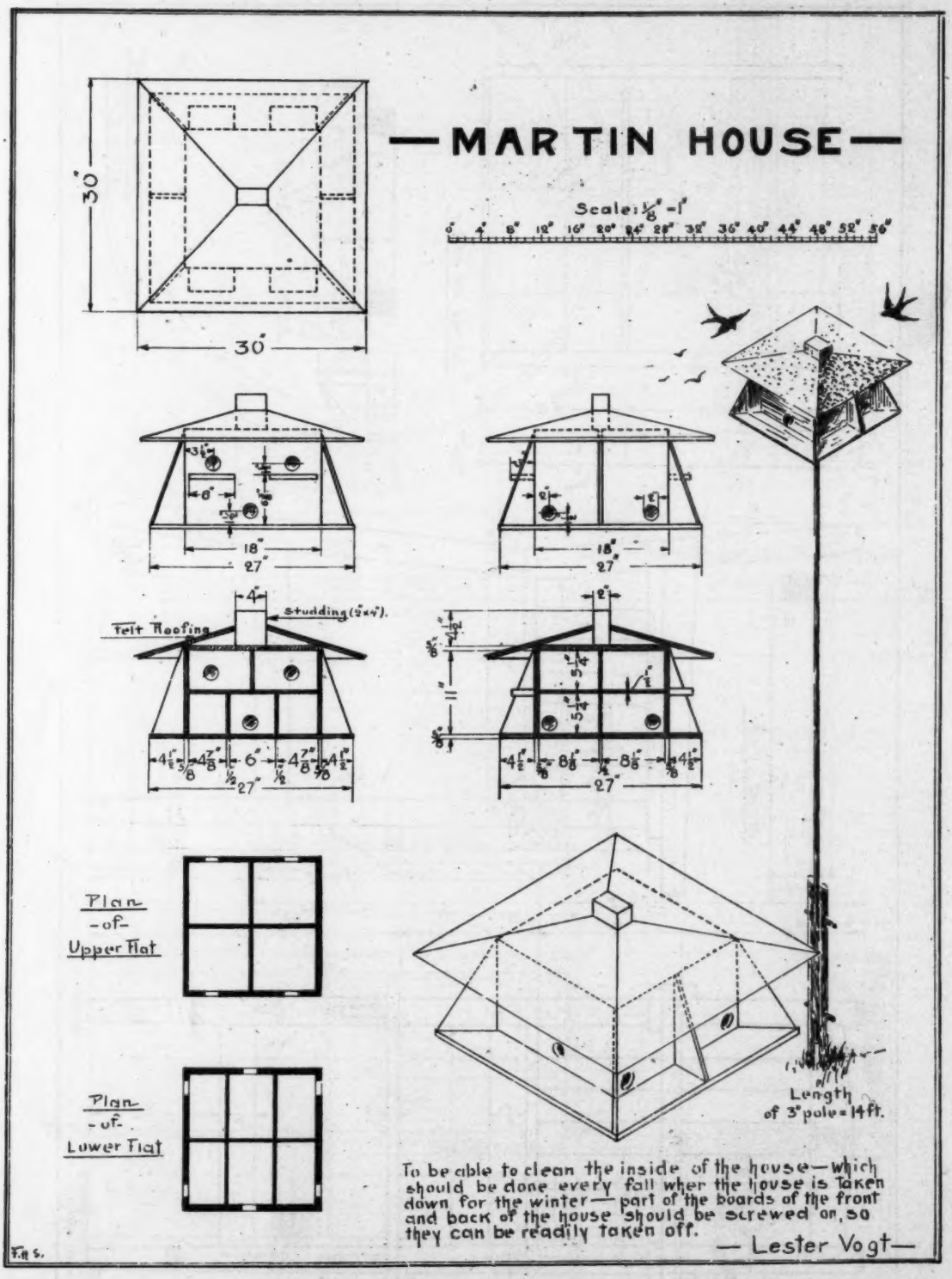
This bench was designed and built to meet the need in the high school at Portsmouth, N. H.

The front edge of the racks is about three inches back of the inner edge of the sand box allowing most of the surplus sand from the flask to fall where it belongs instead of on the floor. The racks, of course, are removable giving easy access for tempering the sand, but in moulding, the sand is taken out thru the space below the racks.



The lids have a flap hinged to the front edge which closes this space but still swings out of the way when the bench is open for use. These lids keep the sand moist and also keep out foreign matter, when the bench is in the Pattern Shop as this one is. The overhead shelf holds flasks, riddles, etc., within easy reach, yet out of the way.

Ordinary "native" pine was used in the construction. The 2" stock in the sand box was splined together and the ¾ for the upper part and lids was matched. It is built into the shop, the floor being used for the bottom and a brick wall for the back.


—MARTIN HOUSE—
Scale: ½" - 1'
30"
30"
18"
27"
Felt Roofing
Studding (2"x4").
Plan of Upper Flat
Plan of Lower Flat
Length of 3" pole = 14 ft.
To be able to clean the inside of the house—which should be done every fall when the house is taken down for the winter— part of the boards of the front and back of the house should be screwed on, so they can be readily taken off.
— Lester Vogt—
F. H. S.

DETAILS OF MARTIN HOUSE DESIGNED AND MADE BY STUDENTS OF MR. F. H. SIMONS, DIRECTOR OF MANUAL ARTS, LA PORTE, IND.

THE WINDMILL.

By Michael C. Dank, Brooklyn, N. Y.

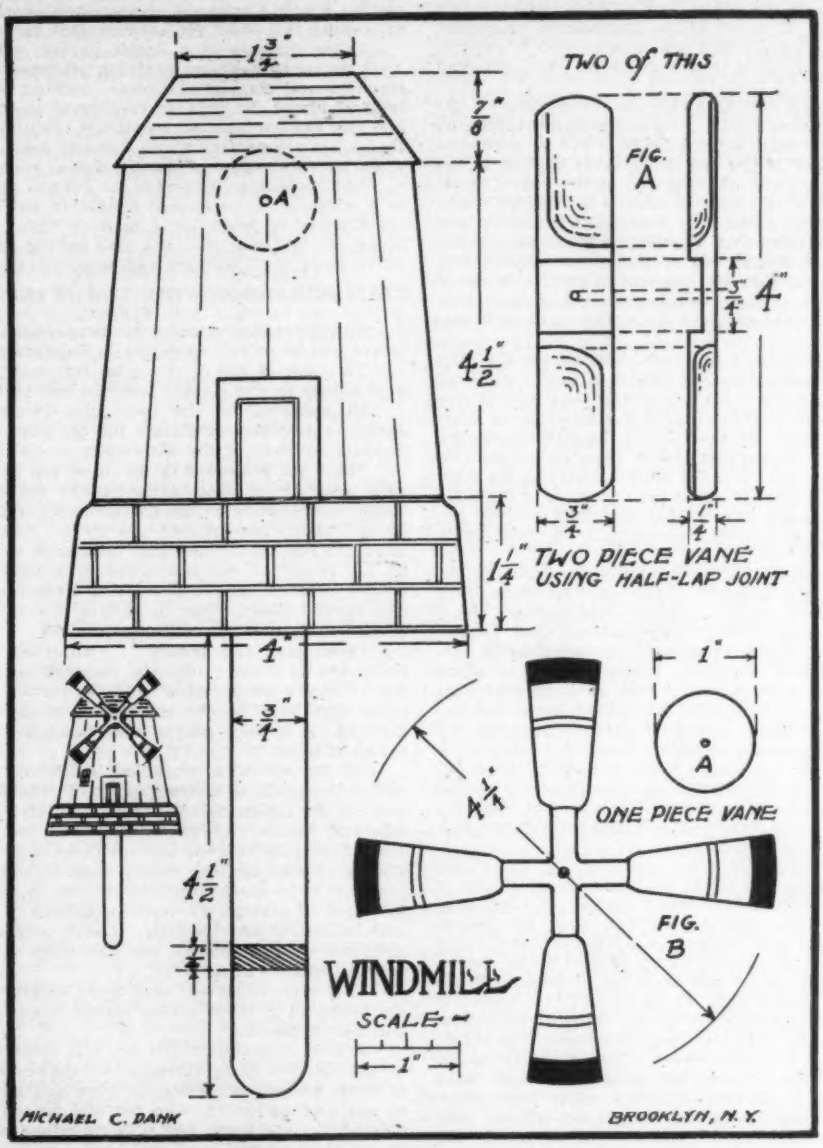
Any toy that has action and mechanical motion will always prove a favorite with children. Such a toy is the Windmill. What is more fun for the playful boy, than to run thru a cooling breeze, holding his windmill high in the air while the vanes spin around with great speed? Being simple in construction, and as but a few tools are needed in its make-up, this problem is suitable for the fifth and sixth grades.

The back piece, constituting the mill and handle, is laid out on a board measuring 10″x4¼″, using any ¼″ stock such as white-wood or basswood.

The vane represented in Fig. b, is traced to a board measuring 4½″ square. I would suggest three-ply wood for this type of vane to prevent breakage. For class work it is advisable to make a full size drawing of all the parts on architect's tracing linen. With the use of carbon paper, an accurate impression of all the details of the drawing can be made on the wood.

A coping saw is used to cut out the parts which are then thoroly sandpapered. When assembling, bore necessary holes and join with a 1″ cotter-pin. A washer, ¼″ thick, is to be placed between the mill and the vane.

Fig. a represents a vane which is more difficult and in which a half-lap joint is used.



A HIGH CHAIR.

F. W. Ziegenhagen, Instructor in Woodwork, Boys' Technical High School, Milwaukee, Wis.

The high chair, illustrated in the accompanying drawing, was designed and made in the author's class. Altho not a standard, everyday problem for a wood working class, nevertheless, a number of boys will take an interest in constructing a high chair if a drawing is at hand.

It is suggested that the student make a full-size layout of the side view, in order to help him cut the legs of the chair correctly and also to help him assemble the chair.

Care must be taken when cutting the angle of the side rails. A wedge adjusted on the cross-cutting attachment of a ripsaw will answer the purpose in getting the proper angle.

The dishing of the seat may be accomplished with a round-shaped spoke shave and a template made to guide the pupil.

The problem may be made of birch, red or white oak, and stained to suit.

ADMINISTRATION OF VOCATIONAL EDUCATION IN CITY SCHOOL SYSTEMS.

E. E. Gunn, Jr., State Supervisor of Vocational Education for Wisconsin.

It is essentially important that the matter of administration of vocational education in city school systems be given earnest consideration. Considering the fact that this type of education is dealing with a majority of our young people from fourteen to eighteen years of age, it becomes the job of a specialist in this line of work to properly lay the plans and put into execution the problems of vocational education. More important than any other one field in the city system of schools is that of administering this field of education. It is of prime importance, therefore, that the man selected for this job be one who is capable not only in teaching lines, but also as an executive and an administrator.

The field of work coming under the observation of the director of vocational education in a city school system may be divided into two well defined fields. One of a general nature and the other of the specific natures applied to the actual administration and organization of the school work. Let us first consider the matters that would come under the observation of the director of vocational education and which might be considered of a general nature. Let it not be supposed that these two fields would be entirely separate, but rather take it for granted that the work of each would dovetail into the other, sometimes one forming the basis for the accomplishment of the other, and vice versa.

In the first place it is of prime importance that the director of vocational education make a thoro study of the industries of the city. He must have facts and figures at his command which will tell him the story as to labor conditions in that city. He must know the advantages and disadvantages in the various fields of occupation. He must know of the possibilities for apprenticeship. He must know as to their suitability, as to the occupations for child labor. In fact, he must have at his command a clear picture of the industrial conditions especially as relating to school attendance.

He must also establish proper relations with the industrial life of the community. This can be done thru various organizations such as labor organizations, business men's clubs, commercial organizations and various clubs for promoting industrial life in the community. He must identify himself with the promotion work which these organizations have in mind and so interweave his work with that of the industrial life of the city, that the institution which he builds will form part of the warp and woof of the final accomplishment.

The director of vocational education must, thru his contact with public officials, with the public and with the general and parochial school organizations, see that the vocational school work forms an integral part of the educational program of the city.

The vocational director must stand as the expert advisor of the Board which directs the educational affairs of the community insofar as the work applies to vocational education. Teachers should be selected upon his recommendation, buildings and rooms and equipment and facilities for carrying on the vocational program should be arranged for according to the advice of the vocational director. He must be looked upon as the person to appeal to in matters of judgment concerning the needs of industrial education in that city. He also has direction of the teaching force, must look after the needs of the students taking vocational work, must establish proper contact with parents, and thru visits and in every other way possible, keep in close touch with the employers of the community. These are matters of a general nature which will make for the success of the administration of vocational education in any city.

As to specific duties, there are such matters as arranging for vocational courses to be given in connection with the school work. From his study of the industries thru his connection with the industrial life of the community he will be able to intelligently select the proper vocational courses with which to make a beginning in this field of work. He will also be able in this manner to plan additional education courses of a vocational nature from year to year as to finally build up a complete vocational program for the city.

He must also take into account the many complications which arise in the making of a program or schedule of courses for putting this work into execution. Taking into account the age and progress of the students, their occupations, their time available for school and their needs as to vocational advancement. Also in the matter of formulating the subject matter of the school work there will be much need for intensive study of the problems of classification as to kinds of work. There will be the one-half time to be devoted to shop work which should be of a practical and useful nature, and as far as possible for the purpose of training for entrance and advancement in industry should be on a production basis. From 30 to 35 per cent of the time should be spent on related vocational work, taking in such subjects as drawing, science, mathematics, and 15 per cent of the time on English, citizenship, hygiene, thus completing a broad program of vocational work which fits people taking this work for advancement in life.

Other matters of a detail nature, such as follow up work on enrollment, maintaining attendance, supervision of teachers and classes, discipline, making use of the industrial plants of the city for vocational work wherever possible, and development of vocational training for the service trades are all matters which demand considerable time and attention on the part of the director of vocational education.

The foregoing illustrates the general and specific duties of a director of vocational education and shows the need in this line of work for a man of broad ability not only along the teaching line, but also having considerable capability along the executive and administrative lines.

CALIFORNIA PART TIME LAW OFFERS OPPORTUNITIES.

The part-time educational law passed by the last legislature will be in full operation in California in 1922.

This law is one of the most far-reaching in its effects ever placed on the statute books of any state.

In speaking of the new law, Professor Charles L. Jacobs, supervisor of classes for teachers of trade and industrial subjects of the University of California, said:

"This act possesses in its scope and power a wealth of rare possibilities such as are to be found in few educational measures or on the statue books of this or any other state. These possibilities are by no means all apparent upon the surface. What may take place or come into being as the result of the enactment of a new law is scarcely totally evident in one possessing numerous aspects. Nor can all the possibilities in such a law be discovered at a single reading.

"Well may the people of California be pleased that there are so many promising possibilities in the part-time act. For the act pertains to the education of the boys and girls who have barely entered upon the duties of wage earners. It is they, who in most cases, are destined for the ranks of labor.

"It is they who, unguided by the corrective information and beneficial instructions of the school, become easy prey of the inflammatory propaganda of irresponsible radicals and to the slavery of industrial conditions. Heretofore these youths were set adrift to cope with the conditions surrounding their employment as best they could.

"Now the state proposes to lend a guiding hand. It will aim to combat the force of ignorance and inefficiency with education and training. And it proposes to do this as completely as a scheme for part-time education for employed youths will permit."

It is very important that every employer, educator and the members of labor unions should know at least the main outlines of the act.

A first glance over the act will show that it is drawn in the interest of specifically two classes of persons. One of these groups comprises the boys and girls over 14 years of age and under 18, who for one reason or another are obliged to go to work, and who, therefore cannot participate in full time education offered by the state.

The other group includes the young men and women between the ages of 18 and 21 who, in the words of the act, "cannot speak, read or write the English language, to a degree of proficiency equal to that required for the completion of the sixth grade of the elementary schools of the state."

The act authorizes courses in vocational education, civics, secondary school courses, trade preparation, home economics and Americanization.

Courses in Americanization include preparation for naturalization, training in speaking, reading and writing English and instruction in the machinery of American government.

The act states that "It shall be the duty of the local

school authorities to provide, in so far as possible, educational opportunities which shall be suitable for the different needs of the individuals attending them."

Classes must be held between the hours of 8 A. M. and 5 P. M., and must be continued for at least four hours a week during the regular school year.

Among the exemptions set forth in the act are persons in attendance upon a satisfactory part-time class maintained by other agencies. This provision of the law will enable employers in large plants to open their own schools for their employes and permit groups of employers to maintain their own courses of instruction.

The responsibility of enforcing the law is placed upon the school superintendent of the various districts.

All employers who employ persons subject to the act are held responsible for the full enforcement of the law. Additional responsibility is placed upon parents and guardians.

The act provides penalties for those found guilty of evading the provision of the law and are as follows:

For parents or guardians: for the first offense, a fine of not more than $10 or imprisonment of not less than five days or more than twenty-five days or both fine or imprisonment.

For employers: For every offense, a fine of not less than $50 and not more than $200 or imprisonment for not more than sixty days or both fine or imprisonment.

During the years 1919-1920 the provisions of the act are effective for persons under sixteen years of age. During 1920-1921 to persons under 17 and during 1921-1922 they apply to all persons subject to the act.

NEW BOOKS AND PAMPHLETS.

Every Step in Canning.

Grace Viall Gray. Cloth, 253 pages. Forbes & Co., Chicago.

The cold pack method of canning is fully described in this book. The author does not limit herself to fruits, but includes vegetables, soups, meat, fish, etc. Additional chapters take up drying of fruits and vegetables, brining, curing and smoking meats, "canning" eggs, etc.

It is interesting to note that the author first observed the cold pack method at the Northern Illinois State Normal in DeKalb, and that the methods and principles which she has evolved are all based on a few "lessons" which she received at this school.

Mechanical Drafting Manual.

By Charles B. Howe. Two parts, 18 plates each. Price, 50 cents each. John Wiley & Sons, New York.

This manual consists of fifteen lesson sheets on the elements of mechanical drawing and sixteen lesson plates on the geometry of drawing. It will be valuable for short courses where men are enrolled at all stages of advancement and where individual lesson assignments and supervision must be given. The plates require a textbook or a good teacher to supplement the limited directions for work.

Brief of the Technical, Scientific and Professional Services Presented to the Joint Commission on Reclassification of Salaries, December, 1919. The proper conduct of government business requires that all should function efficiently. In the present brief are discussed those matters which are of common interest. Special briefs have been submitted as supplements in which are discussed such matters as are of particular interest to the several services or sub-services represented. These include biological sciences, astronomy, meteorology, geology, chemistry, civil engineering, marine engineering, mining, forestry, educational administration and research, medical science, nursing, architectural engineering and physics.

PUBLICATIONS.

English for the Foreign-Born, Series Nos. 4 to 7; *Writing and Reading for Illiterates*, No. 7; *Lefthand Writing and Legible Handwriting*, Nos. 8 and 9; *Typewriting for Professionals and Amateurs*, No. 10; *Calisthenics for Curative Purposes*, No. 12; *Unit Courses in Machine Shop Practice*, Nos. 15 to 21; *Penmanship for Men with Common School Education*, No. 22; *Vocational Arithmetic for Agriculturists*, No. 23; *Rehabilitation Courses for Disabled Soldiers*, No. 25; *Use of the Slide Rule*, No. 26 *Wood Working for the General Farm, Dairy and Poultry Farm*, Nos. 27 to 29; *Preparing Shoes for Machine Finishing*, No. 30; *Machine Work in Shoe Repairing*, No. 31; *Bell Wiring*, No. 32; *Physical Education*, No. 34; *Automobile Repairing*, No. 35; *Power Plant Operating*, No. 36; *Bookkeeping for Accountants*, No. 37; *Painting and Decorating*, No. 38; *Elementary Machine Drawing*, No. 39; *Steel Square and Its Use*, No. 40; *Care of Woodworking Tools*, No. 41; *Printing*, Nos. 43 and 44; *Sheet Metal Work*, Nos. 45 and 46; *Machine Shop Practice*, No. 48; *Blueprint Reading for Carpenters*, No. 53; *Telegraphy*, Nos. 56-57; *Farm Bookkeeping*, Nos. 62 and 63; *Partnership Business for Professional Accountants*, No. 67. Rehabilitation Monographs, 1919, issued by the Federal Board for Vocational Education, Washington. Agriculture.

Sheet Metal and Electricity Courses, Wisconsin Vocational Schools. Monographs Nos. 2 and 4. Issued by the State Board of Vocational Education, Madison, Wis. These courses are intended for students employed in these lines and also for those desiring elementary work preparatory to engaging in one or the other of these occupations. The courses are based upon operations common to the ordinary shop and emphasis is placed upon shop problems, equipment and correlations with academic subjects.

Books at Work in the War During the Armistice and After. George B. Utley, executive secretary, American Library Association, Washington, D. C. The pamphlet is well printed and illustrated and gives a resume of the library work on ships, in the naval training stations, in camp recreation buildings, in the army hospitals, and in the hospitals conducted by the Public Health Service for the benefit of discharged soldiers, sailors and marines.

Suggestions for Teaching Manual Arts. Prepared by H. W. Schmidt, Supervisor of Manual Arts, Madison, Wis. Issued by the State Department of Public Instruction, Madison. The author states that a series of suggestions will be issued for the benefit of teachers which will set forth, in some detail, desirable features of the manual arts work. The bulletins will be issued at monthly intervals and may be kept for permanent use. The present bulletin offers a list of books, together with the names of the publishers and their addresses.

Camp Pike College, Camp Pike, Ark. The pamphlet gives a brief but clear idea of the variety and scope of the vocational courses offered in the army school at Camp Pike. In addition to the regular academic subjects, instruction is offered in pharmacy, commercial work, metal work, carpentry, motor mechanics, army cookery and baking, remount, ordnance and motor transport work.

A First Lesson in Vocational Guidance. E. W. Weaver. Issued by the United Y. M. C. A. Schools, Home Study Division, New York, N. Y. The pamphlet takes up a study of the need of vocational guidance. It discusses, among other things, the fields of activity, employment supervision, readjustments, prospects and training.

Training Teachers of Agriculture. Bulletin No. 66, 1919, U. S. Bureau of Education. Price, ten cents. The pamphlet contains the addresses delivered at the ninth annual meeting of the American Association for the advancement of agricultural teaching, at Baltimore, Md., Jan., 1919. The pamphlet discusses the training of teachers, relation of general science to agricultural instruction and emergency training courses.

How Teachers May Use Farmers' Bulletin 602, Clean Milk: Production and Handling. Alvin Dille. Circular 67, Jan., 1920, U. S. Department of Agriculture. The leaflet is intended for teachers in elementary schools, secondary schools, and urban and rural schools. It is intended to help improve instruction in agriculture and kindred subjects and to directly connect it with community interests.

Outlines of Instruction in Related Subjects for the Machinist's Trade. Bulletin No. 52, Series No. 13, Dec., 1919. By Mr. Charles R. Allen and Mr. Frank Cushman. issued by the Federal Board for Vocational Education, Washington, D. C. Among the related subjects of the trade covered in the booklet are trade drawing, mathematics, science, technical content, organization and definitions of terms.

The Public School System of Memphis, Tenn. Bulletin No. 50, 1919. Part VI, Industrial arts, home economics, and gardening. Price, ten cents. U. S. Bureau of Education, Washington, D. C. The pamphlet is one of a series of seven issued in connection with a survey of the school system made under the direction of the commissioner of education. The pamphlet discusses manual training, handwork, shopwork, vocational education, prevocational work, unit trade classes, part-time classes, evening classes, home economics, school gardening, and colored vocational schools.

FEDERAL AID FOR VOCATIONAL EDUCATION.

Edward H. Crussell, Sacramento, Calif.

May I be permitted to point out that the last paragraph of Mr. Jos. Weintrob's letter, on page 44 of the January Magazine, carries its own answer, altho the answer is perhaps too deeply hidden for the "regular" or academic educators to discover it without some outside assistance; nearsightedness in vocational matters being the most common malady with which this class is afflicted?

The letter asks, "Why create a class consciousness of providing federal aid for vocational teachers and neglecting the vast group in the older system?" Let us change the question a little and put it this way; Why on earth should it be necessary for the federal government to provide financial aid for the teaching of vocational subjects in the public schools? The answer is the same to both questions, because the old-time, regular academic educators are too near-sighted, obstinate, stiff in the joints, and too apprehensive of the loss of their present soft jobs, to take the initiative and introduce some real teaching into the curriculum until they are shoved into the matter from behind. The very fact that anyone can be found who will write a letter such as the one mentioned in the foregoing, is proof enough that some kind of outside aid is needed.

It is over forty years since manual work was introduced into the American schools. At its inception it may, or may not, have been intended for vocational education, but whether it was or not, the fact remains that a large majority of taxpayers and parents thought that it was intended for vocational education and the "regular" educator, instead of waking up to the fact that in this case the wish was father to the thought, and that the majority of the people thought that manual training was vocational training because they wished it so, spent their entire time in explaining that manual training was not intended for vocational training and why it was not. Again proof enough that aid was needed from somewhere.

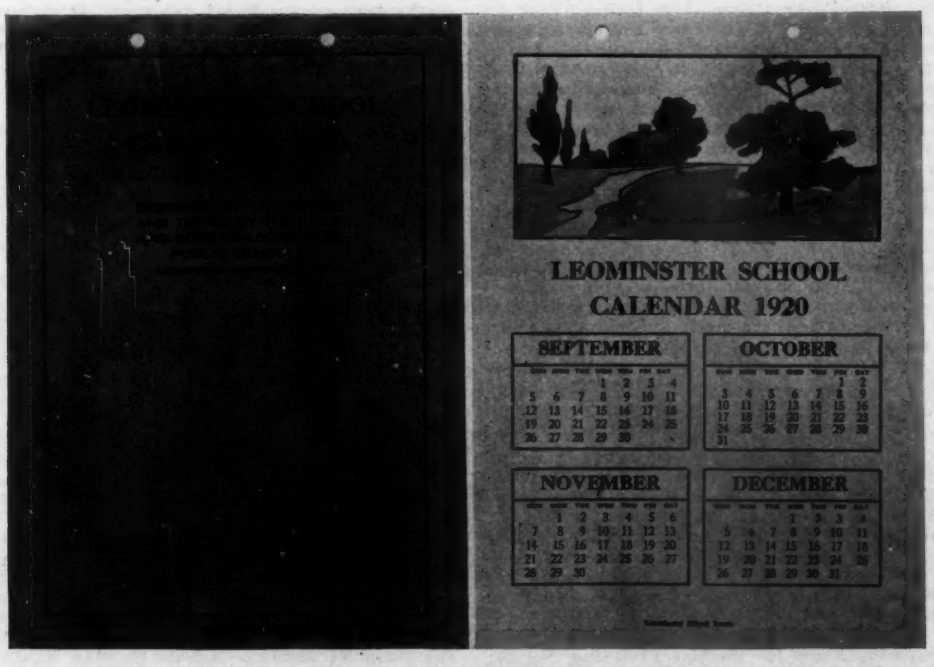
That there is a need of vocational training, every wideawake student of modern conditions is aware. A country's greatest asset is its labor, and the difference between skilled and unskilled labor is so great as to be incalculable. It is the thing which changes a pound of steel worth five dollars, into 84,000 watch springs worth $30,000. It is also the thing which has in the past enabled the Swiss to buy a pound of cotton from us for three cents, and sell it back to us in the form of handkerchiefs for fifty cents. The important thing to note in this transaction is, that in the first sale we were out the pound of cotton (which according to competent authority had taken three cents worth of potash out of the soil) and in the second sale the Swiss were out nothing but their labor.

"But," says the conscientious objector, "even tho you prove that vocational training is necessary, why must *we* go to the expense and exertion of changing all our time tried plans in order to teach it in the public schools? We, in the sweat of our brows, have beaten a trail thru the forest of ignorance, and altho the trail is full of ruts, these ruts fit the wheels of our educational ox-cart to a nicety, why should we be expected to level in these ruts in order to make easy the passage of your vocational automobile?" The answer is, we have given up expecting anything of the kind and intend to do some of the leveling ourselves.

A great cry goes up from the academic people about the evils of a dual system of education. Well, vocational education is here, and here to stay, and unless the academic people turn to and help it, instead of putting all sorts of obstructions in its path, a dual system of education there is going to be and the academic people will have nobody but themselves to blame for it.

The letter also says, "Vocational teachers receive nearly double the salaries of others, and deserve less from the point of view of efficiency and preparation." If this is so, why do not the academic teachers, with their greater efficiency and preparation, take up vocational teaching and thus double their salaries? Everybody knows the answer.

The wise academic teachers will never complain of the greater salary received by the vocational teacher, because a comparison of salaries is about the only way in which they will ever get an increase. Many of them are already getting much more than they are worth, and more than they could possibly earn in any other line of business.



"The Leominster School Calendar 1920" is the title of a well designed and carefully printed four page calendar issued by the schools of Leominster, Mass. The calendar was prepared under the general direction of Mr. Daniel Darney, director of manual arts, the drawings were made under the supervision of Miss Rowena Brown, head of the Art Department. The illustrations for the several pages were drawn by students of the high school and tinted with water colors by members of the eighth grade. The printing and binding are products of the school print shop.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Toy Aeroplanes.

28. Q:—Where can I find a text, or instructions for constructing toy aeroplanes?—*E. D.*

A:—*Collins' Boys' Book of Model Aeroplanes*, $1.20, Century Co., N. Y.; *Hubbard & Turner's Boy's Book of Aeroplanes*, $1.75, Munn & Co., N. Y.; *Collins' Boy's Airplane Book*, $1.50, F. A. Stokes, N. Y.; *Marten's Manual Training—Play Problems*, $1.25, Macmillan Co., N. Y.; *Simmonds' All About Aircraft*, $1.50, Funk & Wagnalls Co., N. Y.

Kites and Birdhouses.

35. Q:—We desire to secure a book on the making of kites and birdhouses.—*H. C. B.*

A:—The only book that combines the two subjects is *Moore's Manual Training Toys for the Boy's Workshop*, $1, Manual Arts Press, Peoria, Ill. Other books are: *Miller's Kitecraft and Kite Tournaments*, $1.50, Manual Arts Press; *Miller's Construction and Flying of Kites*, $0.25, Manual Arts Press; *Hall's Handicraft for Handy Boys*, $2, Lothrop, Lee & Shepard, Boston; *Adams' Outdoor Book for Boys*, Harper Bros., New York; *Siepert's Birdhouses Boys Can Build*, $0.60, Manual Arts Press, Peoria; *Dearborn's Birdhouses and How to Build Them*, Bull. 609, 1914, U. S. Department of Agriculture; *Ladd's How to Make Friends with the Birds*, $1, Doubleday, Page & Co., Garden City, N. Y.; *Stevenson's Some Suggestions on the Construction of Birdhouses*, Chicago Academy of Sciences; *Baxter's Birdhouse Architecture* (in press), Bruce Publishing Company.

Floor Finishes.

36. Q:—I have always used shellac previous to a wax finish. Recently I have come in contact with a painter who advocates the use of varnish instead. Can you give me information which will explain why either varnish or shellac should be used? The floors that are to be finished are made of pine and are to be stained, followed by either shellac or varnish, and then waxed.—*F. A. F.*

A:—The whole question of a choice between the use of shellac or varnish coats preceding the use of a wax polish, hinges upon this factor, namely, the amount of care which the floor will receive after it is ready for use. For instance, if the house is of the ten to fifteen thousand type with servants' quarters accommodating a maid and chauffeur, there will be sufficient help available to keep these floors properly cleaned and waxed each week. On the other hand, if the house is being taken care of by the owner's wife, with or without the help of a servant, it would be something of a task to polish these floors more than once a month.

In the first instance the use of shellac is entirely safe, since the material may be protected by frequent waxings. In the ordinary household, however, this would not be true and the areas in front of doorways and on stairways and landings which soon show wear because of the inability of shellac to resist water. In such a case I should recommend the use of two coats of Pratt & Lambert's No. 61 floor varnish, a highly resistant material which occasional waxings will bring to a good luster and clearness. The only reason for which shellac is used in preference to varnish when preceding wax coats lies in the fact that the mechanic may clean up the floor, give two coats of shellac, two coats of wax and turn over a beautiful floor at the end of an eight hour day. The use of varnish on the other hand necessitates the drying of not less than three days and preferably seven between coats, but the durability and the ease with which varnish may be taken care of more than offsets the additional time required for its application. In either case should recoating be necessary all wax should be thoroly removed with sponges or rags soaked in benzine. The floor should be wiped up with sponges soaked in gold dust solution of moderate strength.—*R. G. Waring.*

Stain for Redwood Chests.

38. Q:—We are building cedar chests from redwood and have used reddish mahogany stain for finish. Can you recommend a suitable finish that will be a good imitation of red cedar?—*N. P. P.*

A:—My continued experience with the problem of suitable finishes for woods constantly tends to impress upon me the fallacy of attempting to imitate or counterfeit one wood for another. It has seemed best to me that the natural beauty and essential characteristics of the wood should be emphasized in each case, rather than an attempt to make what invariably turns out to be an imitation which fools no one.

I believe that if this wood be treated with linseed oil, five parts, turpentine, four parts, and japan drier, one part, when used as a wiping coat and allowed to dry until thoroly hardened, will in a short time, produce a very pleasing reddish tone, quite peculiar to this wood. It should, however, be followed by three or four coats of Pratt and Lambert's No. 61 or Keystone DeGrah varnish. The last two coats should be carefully rubbed out with FF pumice stone, felt pad and water, and cleaned up in an oil polish so as to leave it in a semi-gloss finish.

The only way in which redwood could be successfully imitated would be to stain so as to match the southern cedar and then lay on color lines and knots with graining tools and brushes in a manner similar to that employed in the production of imitations of Brazilian rosewood. Needless to say, this is quite impossible for the manual training teacher or even the trade school shop.—*R. G. Waring.*

Walnut Stain on Birch.

39. Q:—Can you advise the best walnut stain and method of applying it to birch?—*M. R. M.*

A:—To make a walnut stain suitable for birch, use one ounce of bichromate of potash, one ounce of carbonate of soda per gallon of hot water. After this has been applied and allowed to dry thoroly, sand perfectly smooth. Then apply a mixture of walnut brown and nigrosine black, twelve ounces of the first and two ounces of the latter, of which dry mixture use three ounces per gallon of water as a second coat. It will be necessary to try out the colors on panels in order to lighten or add depth to the tone, which may be shaded to any depth by adding a little more of the walnut and nigrosine mixture, when this is dried for at least 24 hours to complete the change in color, produced by the carbon dioxide of the atmosphere. Instead of the shellac coat, the use of the following is recommended: Four parts Keystone DeGrah Varnish, two parts Asphaltum Varnish, one part Japan drier and ten parts benzine or turpentine, preferably benzine. This mixture should be thoroly shaken together or otherwise mixed, applied freely with a brush and then carefully wiped smooth and clean from the wood to leave a bright, clear surface. This will act as a toner and filler and at the same time, appreciably clear up the color. It should be allowed to dry until thoroly hardened, which will be about 24 hours in a warm room, and may be followed by a coat of clear Keystone DeGrah or Pratt and Lambert No. 61, which when perfectly hard, should be cut down with a split 0000 sandpaper. Enough varnish should be used to give a full even surface, which should be rubbed to a semi-gloss with FF pumice stone, felt pad and water and afterwards cleaned up with a good oil polish.—*R. G. Waring.*

Flat Toy Making.

41. Q:—Have you any books on toys and toy making? I would like some plans of animal cut-outs similar to the toy dog in a recent issue.—*G. T. M.*

A:—*Toy Animals I Can Make*, $0.35, Platt & Neck, New York City; *Williams' Manual of Toy Dogs*, $0.60, Longmans, Green & Co., New York; *Worst's Industrial Work for the Middle Grades*, $3.50, Bruce Publishing Co.; *Manual Training—Play Problems*, $1.25, Macmillan Co., New York; *Johnson's Coping Saw Work*, $0.20, Manual Arts Press, Peoria, Ill.; *Kunow's American School Toys* (in press), Bruce Publishing Company.

Furniture Enameling.

48. Q:—Do you publish any book that gives instructions for enameling furniture and small articles?—*E. H.*

A:—Enameling is treated quite clearly, and in detail, in each of the following standard books on wood finishing: *Schmidt's Problems of the Finishing Room* (p. 237), $5, Periodical Publishing Co., Grand Rapids, Mich.; *Kelly's Expert Wood Finisher* (p. 124), A. A. Kelly, Malvern, Pa.; *1,995 Paint Questions Answered* (p. 235), $6, Painters' Magazine, New York; *Staining and Polishing*, $0.87, Evans Bros., London.

A very suggestive paper on the subject will be found in the Magazine for February, 1920 (p. 72).

EASTERN ARTS ASSOCIATION.

The Eastern Arts Association will hold its annual meeting April 1, 2 and 3, at Boston, Mass. The convention is to be known as the Pilgrim Meet, as it is the anniversary year of the landing of the pilgrims in Massachusetts. An especially fine program is being arranged.

There will be an interesting exhibit in Wentworth Institute which will aim to show courses and suggestions having a definite educational aim as, for example, the close tieup of academic and shopwork, a feature of prevocational education which should extend thru the grades. The Boston Museum of Fine Arts will have special exhibits and will open its doors for the convention. Mrs. Gardner's Italian Palace will be open to those who wish to see some fine works of art.

The headquarters for the convention will be at the Hotel Brunswick, Huntington Avenue, near Copley Square. The general meetings will be held in the Wentworth Institute, Boston Trade School, Boston Normal School, Simmons College and Boston Museum of Fine Arts. All of these meeting places are within easy walking distance and provide convenient housing for the convention activities.

Tentative Program.

Thursday Morning, April 1.

General Session: 9:30 A. M.

Business Meeting.
Addresses.

Thursday Afternoon.

Art Session: 3:00 P. M.

A New Emphasis in Art Education, Helen E. Cleaves, first assistant in manual arts, Boston, Mass.

Vocational Art in the High School, Miss Grace G. Starbird, High School of Practical Arts, Boston, and Mr. Huger Elliott, Boston Museum of Fine Arts.

Manual Arts Session.

Teaching the Manual Arts Effectively in a Trade School, Mr. Arthur L. Williston, Principal Wentworth Institute, Boston, Mass.

What the Manual Training and Practical Arts Teacher Can Do for General Education Today, Miss Loretta J. Curran, Boston, Mass.

Cooperative Courses in the Boston High School, Mr. Edward C. Emerson, First Assistant Director of Manual Arts, Boston, Mass.

The Outlook for the Manual Arts in the High School, Dr. Charles W. Parmenter, Mechanic Arts High School, Boston, Mass.

Discussion: Mr. Harry L. Jones, Somerville, Mass., and Mr. Clarence M. Hunt, Milton, Mass.

Household Arts Session.

The Small House, Miss Eleanor Manning, Simmons College.

Textile Charts, Miss Millicent Coss, Framingham Normal School, Framingham, Mass.

School Garden Session.

The Art and Science of Gardening, Prof. W. H. D. Meier, State Normal School, Framingham, Mass.

Training Teachers for School Supervised Home Gardening, Miss Breta Childs, Worcester Normal School, Worcester, Mass.

Vocational Guidance Session.

Address.

Teacher Training Session.

Vocational Teacher-Training in Massachusetts, George A. Burridge, Vocational School, Springfield, Mass.

Vocational Teacher-Training in Another State.

Training Teachers in Service, Harry L. Jones, Director of Vocational Education and Manual Arts, Somerville, Mass.

Discussion: William D. Parkinson, Agent in Charge of Teacher Training, State Department of Education, Boston, Mass.

Friday Afternoon, April 2.

The Problems of an Interior Decorator in a Department Store, A. Clayton Parker, Interior Decoration Department, Jordan Marsh Company.

How to Reach the Public Thru Artistic Display of Merchandise, Ezra Ramin, Display Manager, Jordan Marsh Company.

Friday Afternoon.

Manual Arts Session.

Fundamentals in Teaching Woodwork.

Mechanical Drawing for the Junior High School.

Essential Features of a Practical Course in Machine Shop Practice for the High School, William C. Holden, Public High School, Hartford, Conn.

Teaching Printing Efficiently, Leslie F. Burnell, Lynn High School, Lynn, Mass.

The Proper Training of Manual Arts Teachers, Josef Sandberg, Sloyd Training School, Boston, Mass.

Discussion: Michael Murray, Newton Technical High School, and William C. Crawford, Boston Trade School.

Household Arts Session.

How Can Our Work in Foods Be Made Vital for the Health of Our Child?, Miss Lucy H. Gillett, Director of Dietetics, Simmons College.

Discussion: *The Need as Seen by the Home Demonstration Agent*, Miss Laura E. Comstock, Home Demonstration Agent, Massachusetts Agricultural College.

What Can Be Done for Children of the Pre-School Age?, Miss Winifred Rand, Baby Hygiene Association, Boston, Mass.

What Can the Home Economics Teachers Accomplish?, Miss Josephine Morris, Director of Household Science and Arts, Boston, Mass.

What Can the School Lunch Accomplish?, Miss Daisy B. Treen, Women's Educational and Industrial Union.

How Can We Create a Sense of Responsibility in the Prospective Teacher?, Mr. Frederick Howe, Normal School, Framingham, Mass., and Miss Anna A. Kloss, Agent for Teacher-Training, Household Arts Schools.

Report on Nutrition Classes and Clinics in Massachusetts, Mrs. Alvira W. Sandwall, Division of Hygiene, Massachusetts Department of Health.

School Garden Session.

Uniting Home and School Thru Productive Projects, Dr. Rufus W. Stimson, Agricultural Agent, State Department of Education.

Relation of Home Industry, Commerce and Trade to the School, Prof. O. H. Benson, Director of Junior Bureau of the Eastern States Agricultural Industrial League.

Vocational Guidance Session.

Vocational Guidance Every Day, Owen D. Evans, Principal Continuation School, Boston, Mass.

The Class in Occupations as a Necessary Correlative of Discovery Courses in the School, Miss Annie F. Slattery, High School, Malden, Mass.

Teacher-Training Session.

The Responsibility of the Normal Schools in Training Teachers of Drawing in Relation to General Education; From the Educator's Point of View, Dr. Charles W. Eliot, President-Emeritus of Harvard University.

From the Superintendent's Point of View, Mr. Albert L. Barbour, Superintendent of Schools, Quincy, Mass.

From the Supervisor's Point of View.

The February Round Table meeting of the School Crafts Club was held on Saturday evening, February 21, 1920, at the Ethical Culture School, New York.

Mr. Richard O. Reger of Public School No. 27, Manhattan, New York City, discussed the part the Elementary School Shops can play in Americanization work. Mr. Reger presented interesting details of work done under his supervision in connection with school pageants showing how valuable and essential a part of such a program of Americanization the School Shop may become.

"Radio Models in the Seventh and Eighth Grades" was the topic taken up by Mr. George F. Bowne of the Lafayette School, Newark, N. J. A complete radio set made by boys was displayed. It was evident that Mr. Bowne is not in the "manual training rut" made by some who have gone before but is making a new trail which leads to a sane and sound form of shopwork for the elementary school.

Mr. H. R. Kniffin who heads the art work at the Ethical Culture School discussed "Problems in Design," and illustrated his talk with the excellent design work displayed in the building.

"Machine Shop Work in Vocational Schools" was the topic at a table conducted by Mr. O. C. Frost of the Boys' Vocational School of Newark, N. J. Courses of study in machine shop work were discussed and much of value to vocational men was brought out.

The regular March meeting of the Club is to be held in Paterson, N. J., on Saturday afternoon, March 20th.—*Allen D. Backus.*